3. EXISTING ENVIRONMENT

3.1 SITE DESCRIPTION, LAND USE, AND AESTHETICS

3.1.1 Site of the Proposed Facilities

The proposed project would be located on a 35-acre portion of OUC's existing 3,280-acre Stanton Energy Center in eastern Orange County near Orlando, Florida (Figure 2.1.1 and Figure 2.1.2). The project equipment would be situated between the existing coal-fired units and the existing natural gas-fired combined-cycle unit. The nearly level site is located approximately 3 miles east of the eastern city limits of Orlando and about 13 miles east-southeast of the downtown area.

3.1.2 Land Use

The Stanton Energy Center is located in an unincorporated portion of Orange County. Land use in the vicinity includes a mixture of undeveloped and developed areas. The area north of the power plant has experienced much residential development in the past 10 years. Figure 2.1.2 (the aerial photograph of the site and surrounding area) provides a recent characterization of land use in the vicinity. The 8,427-acre Hal Scott Regional Preserve and Park, which borders the Stanton Energy Center to the east, is public land managed by the St. Johns River Water Management District for public recreation. No other sensitive land use, including prime or unique farmland or wild and scenic rivers, is present in the vicinity of the Stanton Energy Center.

The Florida Department of Corrections' Central Florida Reception Center, which borders the power plant to the southeast, is a three-unit correctional facility with a total capacity of 2,520 inmates. Other areas south of the Stanton Energy Center are undeveloped, both north and south of State Route 528 (the BeeLine Expressway) (Figure 2.1.1). However, much of this land is included in a planned development known as the International Corporate Park, which as originally approved would include over 12 million ft^2 of industrial/office use, 240,500 ft^2 of retail/service use, and 321 hotel rooms. Changes to the planned development were recently being considered that would decrease industrial/office use to approximately 4 million ft^2, increase retail/service use to 410,000 ft^2, and add 3,440 residential dwelling units and 10,000 ft^2 of civic space. However, these changes have been withdrawn pending completion of Orange County's Southeast Sector Study (scheduled for 2006).

The 4,800-acre Orange County Sanitary Landfill borders the power plant to the west. The area between the landfill and State Route 408 to the north is primarily undeveloped. The area immediately north of the Stanton Energy Center, which currently is undeveloped, is known as the Morgan Planned units, 496 townhouses, 670 multifamily units, and 120,000 ft^2 of commercial use. The Morgan Planned Development would also have designated wetlands, parklands, and upland buffers.

Residential developments have recently been built or planned north of the Morgan Planned Development. The nearest development to the Stanton Energy Center is a Development of Regional Impact known as Avalon Park, which would include 3,400 single-family units, 1,431 multifamily units, 221,710 ft^2 of office use, 221,260 ft^2 of commercial use, 185,000 ft^2 of industrial use, 300 hotel rooms, and an elementary school and middle school. To date, subdivision plan and site development approvals have been granted for all of the single-family units, 299 of the multifamily units, and 176,620 ft^2 of the office, commercial, and industrial use (East Central Regional Planning Council 2004). Although Avalon Park was originally scheduled for completion in 2007, this date has been extended by about 5 years.

Orange County has proposed a four-lane extension of Avalon Park Boulevard from north of the Stanton Energy Center, which would run along the plant's western boundary and connect with the BeeLine Expressway to the south (Section 3.7.7.1). This expansion/extension project, which is scheduled for completion by 2008, would likely result in residential development in the Morgan Planned Development north of the Stanton Energy Center and industrial and commercial development in the International Corporate Park south of the power plant.

3.1.3 Aesthetics

Because the site is located within the existing Stanton Energy Center, the visual landscape is conspicuously marked with structures of an industrial character, including the boiler buildings, turbine buildings, stacks, administration building, scrubbers, electrostatic precipitators, natural- and mechanical-draft cooling towers, electrical transmission lines, and other associated infrastructure. The tallest structures are the two 550-ft stacks serving Units 1 and 2, the two 431-ft natural-draft cooling towers serving Units 1 and 2, the 225-ft Unit 1 and 2 boiler buildings, and the two 160-ft Unit A stacks. A buffer of predominantly forested land is provided by the undeveloped 2,180 acres of the Stanton Energy Center site, and a similar buffer is provided by many acres of the surrounding offsite land. The power plant is visible from part of the surrounding local area, depending on the viewing distance, the extent of vegetation to visually screen the facilities from specific viewpoints, and the presence of offsite structures to block the view from specific viewpoints. In general, the 550-ft stacks and 431-ft cooling towers are the only onsite structures that can be seen from nearby homes. Emissions including water droplets from the stacks and plumes of water droplets from the cooling towers are occasionally visible.

3.2 CLIMATE AND AIR QUALITY

3.2.1 Climate

The climate of central Florida is characterized as subtropical. Seasonal variations in temperature and humidity are moderated by the influence of the Gulf of Mexico to the west and the Atlantic Ocean to the east. Summers are warm to hot, humid, and long. Average daily maximum and minimum temperatures occurring in Orlando during the summer months are 91 and 73°F, respectively, with relatively humidity ranging from about 90% during the night and early morning to about 60% in the afternoon. Generally, winters are quite temperate and less humid. The region periodically experiences the passage of weak cold fronts, which in rare instances produce a frost. Average daily maximum and minimum temperatures occurring in Orlando during the winter months are 73 and 49°F, respectively. The record maximum and minimum temperatures measured in Orlando during the period 1944–2004 are 102 and 19°F, respectively. On average, fog occurs 28 days annually with a greater frequency during the winter months.

Average annual precipitation is approximately 48 in., with a seasonal distribution ranging from around 2 in. during each of the winter months to around 7 in. during each of the summer months. Rainfall during the winter months results primarily from the passage of frontal systems. The large amount of summer rainfall is attributed to strong afternoon thunderstorms that can become extremely intense at times. During the period 1950–95, 49 tornadoes were reported in Orange County.

No meteorological stations are located at the Stanton Energy Center. Winds at Orlando International Airport, located about 8 miles southwest of the power plant, average about 7.5 mph. The airport wind rose for the period 1996–2000 is shown in Figure 3.2.1. On an annual basis, the predominant winds are from the northeastern quadrant; however, prevailing wind direction varies appreciably with the seasons. Winter winds are predominantly from the north, winds during the spring are quite evenly distributed with winds from the east-southeast being slightly more dominant, winds during the summer prevail from the southwest quadrant, and winds during the fall are strikingly from the northeast quadrant. Because the terrain in the area is relatively flat and homogeneous, wind patterns would likely be very similar at the Stanton Energy Center.

During the period 1900–2004, the center of 43 hurricanes (maximum winds of at least 74 mph) or tropical storms (maximum winds between 39 and 73 mph) passed within 75 miles of Orlando. Based on this same period, the probability of a hurricane passing within 75 miles of Orlando in any given year is approximately 20% and within 25 miles of Orlando in any given year is about 4%.

Hurricane activity in central Florida was extreme in 2004. The centers of three hurricanes (Charley, Frances, and Jeanne) passed within 75 miles of Orlando. Maximum sustained winds recorded at Orlando International Airport for Charley, Frances, and Jeanne were 80 (before instrument failure), 54, and 61 mph, respectively. During Charley, the airport recorded maximum wind gusts up to 105 mph before instrument failure (Pasch, Brown, and Blake 2005). Prior to the arrival of Charley, the Stanton Energy Center hurricane preparedness plans were implemented to secure the facilities and safeguard employees. The resulting impact of this storm on the structures at the power plant was minimal. The electrical generating units remained online throughout the period, responding to load demand as the hurricane crossed through the service area. As a result of the 2004 hurricane season, OUC has updated the plant's hurricane preparedness plans to further protect the facilities and employees from the potential effects of future hurricanes.

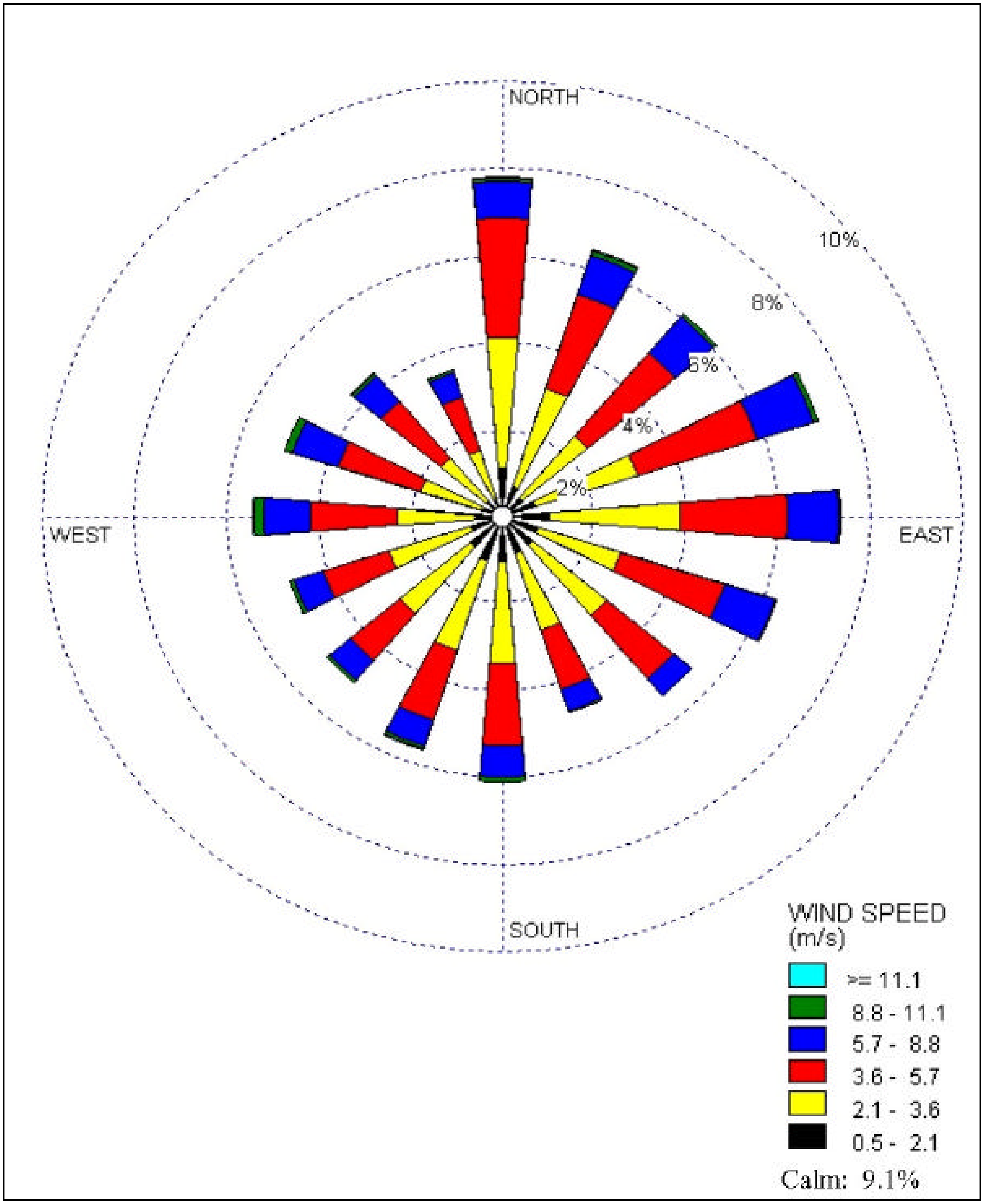

Figure 3.2.1. Wind rose for Orlando International Airport, located about 8 miles southwest of the Stanton Energy Center, for the period 1996–2000.

The height above ground to which appreciable vertical atmospheric mixing occurs (the mixing height) is an important factor influencing atmospheric dispersion of pollutants. If mixing height and wind speed are both very low, atmospheric dispersion of pollutants is limited and the meteorological potential for air quality deterioration is high. Such conditions are rare in Orlando; according to Holzworth (1972), less than one day per year (on average) has a high meteorological potential for air quality deterioration.

3.2.2 Air Quality

Criteria pollutants are defined as those for which National Ambient Air Quality Standards (NAAQS) exist. These pollutants are sulfur dioxide (SO_2), nitrogen dioxide (NO_2), ozone (O_3), carbon monoxide (CO), lead (Pb), and particulate matter less than or equal to 10 μm in aerodynamic diameter, designated PM-10. The U.S. Environmental Protection Agency (EPA) has also promulgated NAAQS for particulate matter less than or equal to 2.5 μm in aerodynamic diameter (PM-2.5) (62 *FR* 38652), and a new 8-hour NAAQS for O_3 to replace the 1-hour O_3 standard (62 *FR* 38856).

The NAAQS are expressed as concentrations of pollutants in the ambient air; that is, in the outdoor air to which the general public has access [40 CFR Part 50.1(e)]. Primary NAAQS define levels of air quality that EPA deems necessary, with an adequate margin of safety, to protect human health. Secondary NAAQS are similarly designated to protect human welfare by safeguarding environmental resources (such as soils, water, plants, and animals) and manufactured materials. Florida standards are the same as the NAAQS except for SO_2 annual and 24-hour standards, for which the Florida standards are more stringent. The applicable (most stringent) standards are presented in Table 3.2.1. The entire state of Florida, including Orange County, is in attainment with NAAQS and state ambient air quality standards for all pollutants, including the recently implemented PM-2.5 and 8-hour O_3 standards.

Attainment status for NAAQS is determined primarily by evaluating data from ambient air quality monitoring stations. Table 3.2.1 provides a summary of air quality data at the monitoring stations in Orange County for the period 2000–2004. All concentrations were within the applicable standards. Pb concentrations have not been monitored in recent years because Pb concentrations have been well below NAAQS, largely due to the decreased use of leaded gasoline in automobiles.

In addition to ambient air quality standards, which represent an upper bound on allowable pollutant concentrations, national air quality standards exist for Prevention of Significant Deterioration (PSD) (40 CFR Part 51.166). The PSD standards differ from the NAAQS in that the NAAQS specify maximum allowable concentrations of pollutants, while PSD requirements provide maximum allowable increases in concentrations of pollutants for areas already in compliance with the NAAQS. PSD standards are therefore expressed as allowable increments in the atmospheric concentrations of specific pollutants. Allowable PSD increments currently exist for three pollutants (SO_2, NO_2, and PM-10). One set of allowable increments exists for Class II areas, which cover most of the United States, and a much more stringent set of allowable increments exists for Class I areas,

Table 3.2.1. Summary of air quality data in Orange County for 2000–04

Pollutant	City	Monitor location	Distance from site (miles)	Averaging period	Year	Ambient concentration (μg/m^3) 1st high	2nd high	Arithmetic mean	Standard[a]	Percent of Standard
PM-10	Winter Park	Morris Boulevard	14	24-hour	2000	46	39		150[b]	31
					2001	46	41			31
					2002	33	30			22
					2003	30	28			20
					2004	41	27			27
				Annual	2000			21	50[c]	42
					2001			20		40
					2002			17		34
					2003			18		36
					2004			18		36
	Orlando	North Primrose Avenue	12	24-hour	2000	37	37		150[b]	25
					2001	48	43			32
					2002	35	31			23
					2003	56	47			37
					2004	41	36			27
				Annual	2000			21	50[c]	42
					2001			22		44
					2002			18		36
					2003			20		40
					2004			19		38
		Sheriff's Department	15	24-hour	2000	48	44		150[b]	32
					2001	53	50			35
					2002	41	38			27
					2003	39	37			26
				Annual	2000			27	50[c]	54
					2001			23		46
					2002			23		46
					2003			21		42
PM-2.5	Winter Park	Morris Boulevard	14	24-hour	2000	35	34		65[d]	54
					2001	--	--			--
					2002	26	25			40
					2003	23	22			35
					2004	28	26			43
				Annual	2000			12	15[c]	79
					2001			11		71
					2002			10		63
					2003			9		62
					2004			10		66
	Orlando	North Primrose Avenue	12	24-hour	2000	35	34		65[d]	54
					2001	52	41			80
					2002	30	27			46
					2003	23	21			35
					2004	38	26			59
				Annual	2000			12	15[c]	80
					2001			11		73
					2002			10		65
					2003			9		63
					2004			10		67
SO_2	Winter Park	Morris Boulevard	14	3-hour	2000	110	71		1,300[e]	8
					2001	84	71			6
					2002	34	29			3
					2003	31	29			2
					2004	37	24			3

Table 3.2.1. Concluded

Pollutant	City	Monitor location	Distance from site (miles)	Averaging period	Year	1st high	2nd high	Ambient concentration (µg/m3) Arithmetic mean	Standard[a]	Percent of standard
				24-hour	2000	34	24		260[e]	13
					2001	37	21			14
					2002	13	13			5
					2003	16	10			6
					2004	13	13			5
				Annual	2000			8	60[c]	13
					2001			5		9
					2002			3		4
					2003			3		4
					2004			3		4
NO_2	Winter Park	Morris Boulevard	14	Annual	2000			23	100[c]	23
					2001			23		23
					2002			21		21
					2003			21		21
					2004			19		19
CO	Winter Park	Morris Boulevard	14	1-hour	2000	8,571	8,571		40,000[e]	21
					2001	9,143	3,086			23
					2002	4,343	4,000			11
					2003	2,971	2,629			7
					2004	2,743	2,743			7
				8-hour	2000	5,371	2,743		10,000[e]	54
					2001	2,400	2,286			24
					2002	3,200	2,857			32
					2003	1,714	1,714			17
					2004	1,829	1,829			18
	Orlando	Orange Avenue	13	1-hour	2000	5,143	5,143		40,000[e]	13
					2001	4,800	4,343			12
					2002	5,143	5,029			13
					2003	3,886	3,657			10
					2004	4,686	3,086			12
				8-hour	2000	2,971	2,971		10,000[e]	30
					2001	2,743	2,400			27
					2002	3,314	2,857			33
					2003	2,286	2,286			23
					2004	2,171	2,057			22
O_3	Winter Park	Morris Boulevard	14	8-hour	2000	165[f]	159[f]		157[g]	98
					2001	159[f]	153[f]			95
					2002	153[f]	149[f]			94
					2003	149[f]	145[f]			N/A
					2004	151[f]	149[f]			N/A
	Orlando	Winegard Road	13	8-hour	2000	159[f]	155[f]		157[g]	96
					2001	153[f]	153[f]			94
					2002	147[f]	145[f]			92
					2003	145[f]	145[f]			N/A
					2004	147[f]	145[f]			N/A

[a]National Ambient Air Quality Standards, except for the more stringent Florida SO_2 annual and 24-hour standards.
[b]Attained when the expected number of days exceeding the standard is less than or equal to 1 per year.
[c]Arithmetic mean.
[d]Attained when the 98th percentile value, averaged over 3 years, is less than or equal to the standard.
[e]Not to be exceeded more than once per year.
[f]Monitored values represent 3rd and 4th highest 8-hour concentrations.
[g]Attained when the 3-year average of each year's 4th highest daily maximum 8-hour concentration is less than or equal to the standard.

which include many national parks and monuments, wilderness areas, and other areas as specified in 40 CFR Part 51.166(e). Allowable PSD increments for Class I and Class II areas are presented in Table 3.2.2. The PSD Class I area nearest to the Stanton Energy Center is Chassahowitzka National Wildlife Refuge, about 90 miles to the west-northwest on the Gulf of Mexico.

Table 3.2.2. Allowable increments for Prevention of Significant Deterioration (PSD) of air quality

Pollutant	Averaging period	Allowable increment ($\mu g/m^3$)	
		Class I[a]	Class II[b]
Sulfur dioxide (SO_2)	3-hour	25	512
	24-hour	5	91
	Annual	2	20
Nitrogen dioxide (NO_2)	Annual	2.5	25
Particulate matter less than 10 µm aerodynamic diameter (PM-10)	24-hour	8	30
	Annual	4	17

[a]Class I areas are specifically designated areas in which the degradation of air quality is to be severely restricted.
[b]Class II areas (which include most of the United States) have a less stringent set of allowable increments.

Contaminants other than the criteria pollutants are present in the atmosphere in varying amounts that depend on the magnitude and characteristics of the sources, the distance from each source, and the residence time of each pollutant in the atmosphere. In the ambient air, many of these pollutants are present only in extremely small concentrations, requiring expensive state-of-the-art equipment for detection and measurement. Measurements of existing ambient air concentrations for many hazardous pollutants are, at best, sporadic. No ambient air monitoring data are recorded in Orange County for mercury and beryllium, two hazardous pollutants that are evaluated in detail in Section 4.1.2.2. Regulation of hazardous air pollutants is attempted at emission sources based on the National Emissions Standards for Hazardous Air Pollutants (40 CFR Part 61; 40 CFR Part 63).

3.3 GEOLOGY AND SOILS

3.3.1 Physiography

The Stanton Energy Center is located in the Osceola Plain region of the Florida section of the Coastal Plain physiographic province. In general, the Osceola Plain is nearly level, varying from undulating to nearly flat, with a few shallow depressions associated with old marine sandbars or dissolution of underlying carbonate rocks. The depressions often lack surface outlets and may contain lakes or wetlands.

The Stanton Energy Center site is mostly flat, but slopes gently downward from southwest to northeast, with natural elevations ranging from approximately 92 ft msl in the southwest to 52 ft msl in the northeast. The 1,100-acre developed portion of the site was filled and leveled at approximately 80 ft msl during construction of Unit 1 in the 1980s.

The most prominent topographic features in the area are the Orange County Sanitary Landfill, bordering the power plant to the west, and the Stanton Energy Center combustion ash disposal facility, located on the western edge of the property.

3.3.2 Stratigraphy and Structure

Central Florida is underlain by a thick sequence of sediments deposited primarily in marine environments during the Cenozoic Era (i.e., approximately the last 65 million years). Regionally, surficial deposits consist primarily of unconsolidated quartz sand interbedded with layers of clay, freshwater marl, peat, and shell. These materials were deposited as alluvium, lake sediment, and windblown sand during the Pliocene, Pleistocene, and Recent epochs (approximately the last 5 million years). The surficial unit, which varies in thickness, is underlain by the Hawthorn Group, a variable sequence of interbedded sands and clayey sands, calcareous silts and clays, and phosphatic limestone and dolomite deposited during the Miocene epoch (approximately 5 to 24 million years ago).

The base of the Hawthorn Group rests on an erosional surface formed over a thick sequence of carbonate rocks of Eocene age (approximately 35 to 56 million years old) or older. In descending order, these rock units are the Ocala Limestone (late Eocene age), Avon Park Formation (middle Eocene; mostly limestone), Oldsmar Formation (early Eocene; limestone with interbedded dolomite), and the Cedar Keys Formation (Paleocene; primarily dolomite) (Murray and Halford 1996). The orientation of these rock layers is nearly flat, with a gentle eastward dip.

At the Stanton Energy Center, sand predominates to a depth of about 140 ft below the ground surface (i.e., to an elevation range of -56 to -79 ft msl). Two clay layers, one about 4-ft thick and the other 4- to 15-ft thick, are present within the sand under much of the site. A layer of cohesive sandy and silty clay, locally interbedded with sand, separates the sand from the underlying limestone bedrock. This cohesive layer ranges in thickness from 43 to 61 ft. Limestone bedrock is encountered about 200 ft below the ground surface at an elevation range of -121 to -135 ft msl.

3.3.3 Soils

Within the 1,100-acre developed area of the Stanton Energy Center site, the surface soil is sandy fill material to a depth of about 5 ft. Outside of the developed area, the principal soil types at the site include Smyrna fine sand, St. Johns fine sand, and Sanibel muck. All three soil types are nearly level and poorly drained, with severe limitations for building site development, sanitary facilities, and recreational use.

3.3.4 Geologic Hazards

The only geologic hazards with the potential to affect the Stanton Energy Center site are seismic (earthquake) activity and sinkhole formation. The potential for both types of hazards is low.

The Stanton Energy Center is in an area of low seismic activity. Florida is one of the lowest seismic hazard areas in the United States (USGS 2001, 2002). The only historical earthquake known to have caused damage in the state was an event in northeast Florida near St. Augustine in 1879, in which heavy shaking reportedly knocked plaster from walls and articles from shelves. Other seismic events affecting the state include an event in northwest Florida in 1780; a pair of 1880 earthquakes in Cuba that were detected in Key West; the Charleston, South Carolina, earthquake of 1886 that was felt throughout northern and central Florida; small shocks in Jacksonville in 1893 and 1900; and several other minor events in the mid-1900s. In central Florida, the peak horizontal seismic acceleration with an estimated 2% probability of occurrence over 50 years is 4 to 6% of the acceleration of gravity, which is unlikely to cause damage. Therefore, the potential for damage from a seismic event is minimal.

Most of Florida is prone to sinkhole formation because it is underlain by soluble carbonate rocks (limestone and dolomite). Slightly acidic natural water passing through void spaces in these types of rocks dissolves the carbonate minerals in the rock and gradually enlarges the voids. The resulting large cavities are efficient transmitters of water but also are potentially subject to collapse, forming sinkholes. Sinkhole collapse has caused major damage in the Orlando area, notably including a 1981 event in Winter Park in which a sinkhole the size of a city block formed within less than 24 hours. However, no sinkholes have been reported at the Stanton Energy Center site. The site is considered to have a low probability of sinkhole development because the carbonate aquifer is covered by very thick clastic overburden and the potentiometric surface in the carbonate aquifer is substantially above the top of the aquifer. Additionally, geotechnical investigations conducted before the Stanton Energy Center was built found only limited evidence of dissolution cavities (bedrock voids were encountered in only two of eight bedrock borings), supporting the conclusion that the potential for sinkholes is very low.

3.4 WATER RESOURCES

The climate of central Florida is subtropical; on average, Orlando annually receives approximately 48 in. of rainfall (Section 3.2.1). Average annual evapotranspiration is estimated to be 33 to 40 in., leaving 8 to 15 in. for runoff to surface water or recharge to groundwater aquifers.

3.4.1 Surface Water

The Stanton Energy Center property lies in the watershed of the Econlockhatchee River, which flows into the St. Johns River approximately 15 miles northeast of the site. A small portion of the western side of the property, including part of the onsite coal-combustion ash landfill, lies in the watershed of the Little Econlockhatchee River, the largest tributary to the Econlockhatchee River. Other nearby tributaries include Hart Branch and Cowpen Branch Creek, on the northeastern and eastern perimeter of the property, which receive runoff from undeveloped areas of the property. The nearby Orange County Eastern Water Reclamation Facility, which supplies treated effluent for use at the Stanton Energy Center, discharges some of its treated effluent (an average of 4.2 million gal/day during the 12-month period February 2005 through January 2006) to a 150-acre artificial wetland from which water flows to a 150-acre natural wetland that drains to an unnamed tributary of the Econlockhatchee River.

At the nearest river gauging station, which is 6 miles upstream from the Stanton Energy Center, the Econlockhatchee River has a drainage area of about 33 square miles. During 30 years of monitoring at this station, measured streamflow ranged from no flow to 474 ft^3/s, with an average of 27 ft^3/s. Occurrences of no flow are frequent at this location. Approximately 6 miles downstream from the power plant is a former river gauging station where measured streamflow from a 119-square mile drainage area ranged from no flow to 7,840 ft^3/s during 7 years of monitoring, with an average of 88 ft^3/s.

For water quality planning purposes, the Econlockhatchee River and its tributaries are categorized as Class III waters according to Chapter 62-302, Florida Administrative Code. This is the classification for surface waters that are designated for recreation, and propagation and maintenance of a healthy, well-balanced population of fish and wildlife. The water quality of the river is characteristic of a swamp-fed Florida river draining through urbanized areas. The water is low in hardness and moderately low in total dissolved solids, with slightly acidic to neutral pH. The water is brown in color due to tannin from natural sources in the watershed. Portions of the Econlockhatchee and Little Econlockhatchee rivers, including the stretch of the Econlockhatchee River nearest to the Stanton Energy Center, have been determined to be “impaired waters” (FDEP 2004) because elevated levels of fecal coliform bacteria (probably due to cattle ranching operations) prevent them from meeting water quality standards for the designated uses of Class III waters. Other measures of water quality are consistent with designated uses. Limited measurements (0.019 and 0.022 µg/L) of mercury concentrations in the river (Julie Bortles, Orange County Environmental Protection Division, personal communication to Joe Dertien, ECT, August 4, 2005) were barely above the detection limit of 0.018 µg/L. Nevertheless, fish consumption advisories have been issued for the river to warn people not to eat certain fish species that bioaccumulate mercury.

Stormwater runoff from developed portions of the Stanton Energy Center drains to a system of lined collection basins and ponds on the site. The largest of these is the makeup pond, a 93-acre manmade pond located east of the main plant facilities, which is used to store makeup for cooling water. Stormwater runoff from areas associated with industrial activity (e.g., coal storage areas and floor drains) is treated by processes such as pH adjustment, oil separation, and suspended solids removal before being routed to the recycle basin for reuse. The makeup pond receives treated wastewater effluent from the Orange County Eastern Water Reclamation Facility (an average of 10.25 million gal/day during the 12-month period February 2005 to January 2006) and treated cooling tower blowdown and other treated effluents from Stanton Energy Center operations. In July 2005, surface water runoff from the Orange County Sanitary Landfill became an additional source of water supply to the pond. Surface water is received from the landfill intermittently (generally after rainfall events). In an average rainfall year the total volume of landfill runoff is estimated to average 2.47 million gal/day. Between July 2005 and February 2006, the makeup pond received an average of 2.5 million gal/day from the county landfill. The makeup pond holds 485 million gal at its average water depth of 16 ft. The makeup pond's water quality is summarized in Table 3.4.1. Concentrations of chloride and other dissolved solids (represented by the conductivity values in Table 3.4.1) are higher than in area streams and groundwater, but the water would be suitable for many uses.

Table 3.4.1. Water quality data for the Stanton Energy Center makeup pond (January 2004–April 2005)

Parameter	Range	Average
pH	7.4 to 8.2	—
Hardness (mg/L as $CaCO_3$)	130 to 146	135
Silica (mg/L)	9.6 to 13.2	12
Conductivity (µS/cm)	662 to 828	724
Chloride (mg/L)	78 to 129	101
Phosphorus (mg/L)	0.26 to 2.77	0.82

3.4.2 Groundwater

The aquifer system in the region includes three main components: (1) the unconfined surficial aquifer in the surficial deposits (stratigraphic units are identified in Section 3.3.2); (2) a confining unit, formed by the Hawthorn Group, that separates the surficial aquifer from the underlying Floridan aquifer; and (3) the confined Floridan aquifer in the Eocene-age carbonate bedrock. The Floridan aquifer is subdivided into two production zones: (1) the Upper Floridan aquifer, in the Ocala Limestone and the upper Avon Park Formation; and (2) the Lower Floridan aquifer, in the lower Avon Park Formation and Oldsmar Formation. A confining unit in the middle of the Avon Park Formation separates the Upper and Lower Floridan aquifers. The Cedar Keys Formation, which has very low permeability, acts as a confining unit beneath the Lower Floridan aquifer.

Groundwater in the unconfined surficial aquifer occurs at relatively shallow depths (i.e., at or near the ground surface) and under unconfined (water-table) conditions. Recharge is primarily from direct rainfall and irrigation. Natural discharge occurs by evapotranspiration and as seepage to lakes, streams, and ditches. Water levels fluctuate seasonally in response to local rainfall. Aquifer thickness is highly variable, depending on the composition and thickness of the surficial deposits.

At the Stanton Energy Center, depth to the water table is typically within 5 to 10 ft of the ground surface. Subsurface investigations have found that the unconfined surficial deposits extend to variable depths ranging from about 30 to 70 ft below ground surface, where the first cohesive (clayey) layer is encountered. This cohesive layer forms the top of a 125- to 156-ft sequence of sediments that can be considered to be the confining unit between the unconfined surficial aquifer and the Upper Floridan aquifer. Groundwater occurs under confined conditions within an 80-ft-thick sand aquifer within this sequence of sediments.

The Floridan aquifer is one of the most productive aquifers in the world, delivering well yields measured up to several thousand gal/minute. In east central Florida, groundwater in the aquifer, which is under confined conditions (i.e., water in wells and borings rises above the top of the aquifer), is stored and transmitted through interconnected fissures, solution cavities, caverns, and channels. Altogether, the Floridan aquifer ranges in total thickness from about 2,000 to 2,600 ft. Most of this total thickness is formed by the Lower Floridan aquifer, which averages 1,500 ft in thickness. Thicknesses of the Upper Floridan aquifer and the confining unit that separates the Upper and Lower aquifers are more variable.

Principal sources of recharge to the Upper Floridan aquifer include downward leakage from the surficial aquifer, direct rainfall in areas where the overlying confining unit is absent or is penetrated by sinkholes, and drainage wells in the city of Orlando that penetrate through the confining unit to convey stormwater runoff or other wastewater directly into the aquifer (Murray and Halford 1996). Groundwater in this aquifer moves regionally in a southwest to northeast direction. Natural discharge occurs primarily in large springs found near or within major rivers or surface water bodies. The easternmost portion of Orange County near the St. Johns River is a discharge area where the potentiometric surface (i.e., the imaginary surface defined by the elevation to which water would rise in wells completed in this aquifer) is above the ground surface, but no major springs occur.

At the Stanton Energy Center, the top of the Floridan aquifer is approximately 200 ft below the ground surface (elevation about -120 ft msl). The potentiometric surface in the Upper Floridan aquifer is approximately 45 ft below the ground surface (elevation about 35 ft msl).

Flow relationships between the unconfined surficial aquifer and the underlying Floridan aquifer vary with the local thickness and properties of the confining unit that separates the two aquifers (i.e., the confining unit formed by the Hawthorn Group) and the elevation difference between the water table and the potentiometric surface in the Upper Floridan aquifer. In areas where the water table elevation is lower than the elevation of the potentiometric surface in the Upper Floridan aquifer, water can leak upward into the unconfined surficial aquifer, thus recharging the surficial aquifer. Where the water table elevation is higher than the elevation of the Upper Floridan aquifer potentiometric surface, downward leakage can occur through the confining bed, thus recharging the Floridan aquifer.

In the vicinity of the Stanton Energy Center, the confining unit between the two aquifers is relatively thick (more than 100 ft) and the water table in the unconfined surficial aquifer is at a higher elevation than the potentiometric surface in the Upper Floridan aquifer. These conditions allow for downward leakage and a low rate of recharge (estimated at 4 to 8 in/year) to the Upper Floridan aquifer.

The Lower Floridan aquifer has not been investigated as extensively as the Upper Floridan aquifer. Like the Upper Floridan aquifer, it is highly transmissive. In east central Florida, the potentiometric surface in the Lower Floridan aquifer has been determined to be a subdued reflection of the potentiometric surface in the Upper Floridan aquifer, with an elevation 1 to 3 ft lower than in the Upper Floridan aquifer (Lichtler, Anderson, and Joyner 1968). Most recharge from the Upper Floridan aquifer to the Lower Floridan aquifer occurs in topographically higher areas in western Orange County and eastern Lake County, as well as in downtown Orlando where heavy pumping from the Lower Floridan aquifer increases the difference between the potentiometric surfaces in the two aquifers.

Water in the Floridan aquifer system generally is of a calcium and magnesium bicarbonate type, reflecting the chemistry of the carbonate bedrock. Total dissolved solids (TDS) concentrations in the Upper Floridan aquifer in most of the Orlando area, including the Stanton Energy Center, are less than 500 mg/L (the secondary drinking water standard for TDS), with chloride concentrations less than 50 mg/L and sulfate concentrations less than 100 mg/L. The unconfined surficial aquifer generally has lower dissolved solids concentrations than the Upper Floridan aquifer, reflecting its nonreactive mineralogy and shorter groundwater residence times, while the Lower Floridan aquifer generally has somewhat higher concentrations of dissolved solids than the Upper Floridan aquifer, reflecting its longer groundwater residence times.

Salt water is found at a depth below the fresh groundwater in the Floridan aquifer. In the center of the Florida peninsula, the interface between fresh groundwater and the denser brackish water or salt water is generally at or below the base of the Lower Floridan aquifer, but nearer the coast this interface occurs at much shallower depths. At the Stanton Energy Center, the interface between fresh water and the underlying salt water is estimated to be at -1,500 to -2,000 ft msl, within the Lower Floridan aquifer. Additionally, in discharge areas such as near the St. Johns River in the easternmost portion of Orange County, the Upper Floridan aquifer contains water with high solute concentrations. This is considered to be relict sea water that entered the aquifer at a time when sea level was higher (Murray and Halford 1996). In easternmost Orange County, concentrations of both chloride and TDS commonly exceed 1,000 mg/L, making the water unsuitable for drinking water and undesirable for most other uses (the secondary drinking water standard for chloride is 250 mg/L; concentrations above that level are considered undesirable for human consumption). In the vicinity of the Cocoa well field (Section 3.4.3), water from the Upper Floridan aquifer commonly has TDS concentrations above 500 mg/L and chloride concentrations above 50 mg/L. Concentrations of both TDS and chloride have been increasing in that area.

The Florida Environmental Regulation Commission has classified the aquifers beneath the Stanton Energy Center as G-II aquifers. A G-II aquifer is one that is used or can be used for potable water supply and has a TDS content of less than 10,000 mg/L.

On the Stanton Energy Center site, monitoring wells completed in the unconfined surficial aquifer are measured and sampled quarterly as part of the site environmental program. Samples are analyzed for pH, temperature, color, turbidity, radioactivity, TDS, anions (e.g., chloride, nitrate, and sulfate), and metals (including cations such as calcium and sodium). Results from most wells show good-quality fresh water with low to moderate levels of dissolved solids (e.g., TDS concentrations below 100 mg/L in some wells and below 300 mg/L in most wells). During the period 1997–2005, wells on the western side of the property near the landfill have shown increasing levels of TDS, chloride, sulfate, sodium, and other dissolved substances associated with salt water. These dissolved substances may come from facility wastewater treatment residues disposed in the landfill or from wastewater used in waste stabilization and management. Levels of potentially toxic metals have not increased over time. OUC is evaluating potential sources and causes of these elevated concentrations observed in monitoring wells and expects to take corrective actions after the investigation is completed (M. Corbett, OUC, e-mail message to B. Toth, Southern Company, April 14, 2006).

3.4.3 Water Supply

Groundwater from the Floridan aquifer is the principal source of water for municipal, industrial, and agricultural uses in central Florida. Some surface water is used, primarily for agriculture, with most surface water obtained from lakes. Historically, stream water has seldom been used because area streams often have no flow during dry periods (Lichtler, Anderson, and Joyner 1968). The unconfined surficial aquifer supplies some water for agriculture and limited domestic uses. It is not often used as a source of potable water because of low well yields, high iron concentrations, and color that may be objectionable (Murray and Halford 1996). The Upper Floridan aquifer is the main source of water supply, but use of the Lower Floridan aquifer is increasing. The nearest water supply wells to the Stanton Energy Center are located approximately 1.25 miles west of the site boundary (OUC 2006).

Two major municipal well fields are located near the Stanton Energy Center. The Cocoa well field supplies approximately 15.5 million gal/day to central Brevard County from 48 wells completed in the Floridan aquifer and the overlying Hawthorn Group (City of Cocoa 2004). The Cocoa wells closest to the Stanton Energy Center are approximately 3 miles to the south-southeast. The Orange County eastern regional well field, located approximately 6 miles west of the Stanton Energy Center, consists of 10 wells supplying approximately 20 million gal/day from the Floridan aquifer.

Two production wells at the Stanton Energy Center obtain water from the Upper Floridan aquifer to satisfy requirements for potable water and boiler feedwater. Groundwater use averaged 0.861 million gal/day before February 2004, but has been reduced to about 0.469 million gal/day by changing the water source for Stanton Energy Center's service water system from groundwater to reclaimed water. Water for noncontact cooling and other Stanton Energy Center uses that do not require high-quality water is obtained from surface water runoff and treated wastewater effluent cycled through the onsite makeup pond (Section 3.4.1). Facility water requirements that can be met with this lower-quality water are calculated at 12.7 million gal/day (Table 2.1.1). The Orange County Eastern Water Reclamation Facility supplies treated municipal wastewater effluent under a contract that provides for delivery of up to 13 million gal/day and the county's municipal landfill supplies additional water from its collected surface water runoff (Section 3.4.1).

The state of Florida has assigned most responsibility for water resource management and related environmental protection to five regional water management districts that serve regions defined on the basis of watersheds and other natural, hydrological, and geographical features. Most of Orange

County, including the Stanton Energy Center, is in the St. Johns River Water Management District. Water demand in the district is growing rapidly. In 1995, water use in the Orange County portion of the district was about 155 million gal/day, of which groundwater provided 136 million gal/day and surface water supplied 19 million gal/day. Water use in this portion of the district is projected to increase by 56% to about 230 million gal/day by 2025, with surface water use declining and groundwater use increasing by 69%. During this same period, water use in the entire 18-county district is projected to increase 38%, from 1,364 million gal/day in 1995 to 1,880 million gal/day in 2025 (Wilder 2003).

Increased groundwater use in the region continues to lower the potentiometric surface in the Upper Floridan aquifer, resulting in reduced flow to springs and increased potential for saline or brackish water to migrate into water-supply aquifers. In the vicinity of the Stanton Energy Center, the potentiometric surface was estimated to be 10-15 ft lower in 1988 than under predevelopment conditions (Murray and Halford 1996). On a regional scale, the water management district estimates that the district's potential maximum water supply from the Floridan aquifer is 670 million gal/day, and demand is expected to surpass this value before 2010. Accordingly, the water management district is working to increase water conservation and the use of reclaimed water, enhance aquifer recharge, and develop new water supplies, including possible desalination of seawater (SJRWMD undated). The water management district has designated the Orange County portion of the district as a Priority Water Resource Caution Area, meaning that "existing and reasonably anticipated sources of water and conservation efforts may not be adequate to (1) supply water for all existing legal users and reasonably anticipated future needs, and (2) sustain the water resources and related natural systems." In Priority Water Resource Caution Areas, the use of reclaimed water is required when economically, environmentally, and technically feasible.

3.5 FLOODPLAINS AND WETLANDS

3.5.1 Floodplains

Most of the 3,280-acre Stanton Energy Center site lies above the elevation of the Federal Emergency Management Agency's determined 100- and 500-year floodplains (FEMA 2000). The elevation of the 1,100-acre developed section of the site was previously filled to approximately 80 ft msl, raising the entire ground surface of the developed area above the elevation of the Federal Emergency Management Agency's 100- and 500-year floodplains. The proposed facilities would be located on a 35-acre portion of this developed area.

3.5.2 Wetlands

Figure 3.5.1 shows vegetation, land cover (including several wetland categories), and existing land uses for the site and immediate vicinity. The figure uses categories developed according to Level III of the Florida Land Use, Cover and Forms Classification System (FDOT 1999). Wetland

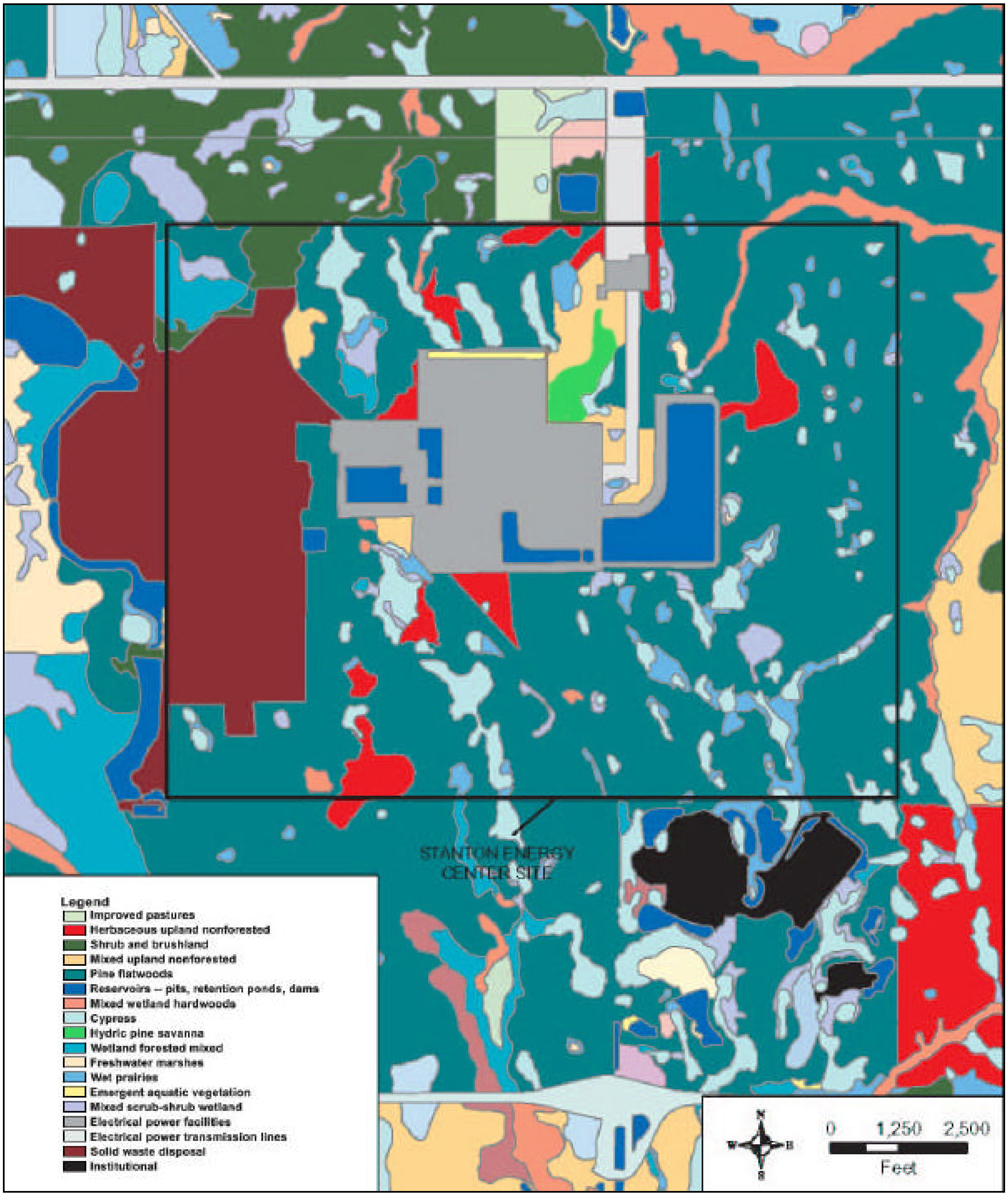

Figure 3.5.1. Vegetation and land cover for the Stanton Energy Center site and immediately surrounding area. *Sources:* SJRWMD 2005; ECT 2005.

determinations were made on the site by Environmental Consulting & Technology, Inc. (ECT), in 2005. Stanton Energy Center and its immediate surroundings are primarily comprised of the following land use/cover types [noted here and initially in the text in all-capital letters]:

(1) IMPROVED PASTURES;
(2) HERBACEOUS UPLAND NONFORESTED;
(3) SHRUB AND BRUSHLAND;
(4) MIXED UPLAND NONFORESTED;
(5) PINE FLATWOODS;
(6) RESERVOIRS;
(7) MIXED WETLAND HARDWOODS;
(8) CYPRESS;
(9) HYDRIC PINE SAVANNA;
(10) WETLAND FORESTED MIXED;
(11) FRESHWATER MARSHES;
(12) WET PRAIRIES;
(13) EMERGENT AQUATIC VEGETATION;
(14) MIXED SCRUB-SHRUB WETLAND;
(15) ELECTRICAL POWER FACILITIES;
(16) ELECTRICAL POWER TRANSMISSION LINES;
(17) SOLID WASTE DISPOSAL, and
(18) INSTITUTIONAL.

No wetlands occur within the developed portion of the Stanton Energy Center. However, wetlands occur within the undeveloped portion, including the northern buffer area where the proposed transmission line would connect the proposed combined-cycle facilities to the existing onsite substation approximately 3,000 ft to the northeast. The wetlands within the buffer areas are interspersed within an upland community type PINE FLATWOODS (Section 3.6.1). The wetlands can be characterized overall as linear strand formations oriented north-south across the property. The more common wetlands occurring within the northernmost undeveloped area of the Stanton Energy Center are pond cypress swamp [CYPRESS], coniferous wetland forest [HYDRIC PINE SAVANNA], pond pine swamp [WETLAND FORESTED MIXED], mixed bay swamp [MIXED WETLAND HARDWOODS], and oak hammock [MIXED WETLAND HARDWOODS] strands.

Pond cypress swamp strands [CYPRESS] are stillwater swamp communities in either circular or linear depressions, which are flooded for most of the year. The vegetation is dominated by a canopy of pond cypress (*Taxodium ascendens*), but also includes pond pine (*Pinus serotina*), swamp tupelo (*Nyssa biflora*), and sweetbay magnolia (*Magnolia virginiana*). The understory ranges from dense to somewhat open and includes wax myrtle (*Myrica cerifera*), St. John's wort (*Hypericum fasciculatum*), shiny lyonia (*Lyonia lucida*), dahoon holly (*Ilex cassine*), and gallberry (*Ilex glabra*). Characteristic species of the groundcover include beak rushes (*Rhynchospora spp.*), sphagnum moss

(*Sphagnum spp.*), sawgrass (*Cladium jamaicense*), tenangle pipewort (*Eriocanlon decangulare*), grape (*Vitus rotundifolia*), greenbriers (*Smilax spp.*), and net-vein chain fern (*Woodwardia virginica*).

Coniferous wetland forest [HYDRIC PINE SAVANNA] is open pine savanna with a sparse canopy of longleaf pines and a ground cover of grasses, herbs, and wetland shrubs. The overstory layer also supports occasional pond cypress. The understory is almost completely open, except for occasional saw palmetto (*Serenoa repens*), gallberry, and wax myrtle. The wet to flooded ground layer is mostly dominated by wiregrass. Other herbaceous stratum associates include longleaf threeawn (*Aristida palustris*), arrowfeather threeawn (*Aristida purpurascens*), roundpod St. John's-wort (*Hypericum cistifolium*), sandweed, swamp flatsedge (*Cyperus ligularis*), haspan flatsedge (*Cyperus haspan*), Carolina redroot (*Lachnanthes caroliana*), roadgrass (*Eleocharis baldwinii*), blue maidencane (*Amphicarpum muhlenbergianum*), erectleaf witchgrass (*Dichanthelium erectifolium*), giant whitetop (*Rhynchospora latifolia*), narrowfruit horned beaksedge (*Rhynchospora inundata*), Florida tickseed (*Coreopsis floridana*), hairy umbrellasedge (*Fuirena squarrosa*), tenangle pipewort, woolly witchgrass (*Dichanthelium scabriusculum*), white lobelia (*Lobelia paludosa*), bluestems (*Andropogon spp.*), southern shield fern (*Thelypteris kunthii*), yelloweyed grasses (*Xyris spp.*), bighead rush (*Juncus megacephalus*), false fennel (*Eupatorium leptophyllum*), rosy camphorweed (*Pluchea rosea*), pineland daisy (*Chaptalia tomentosa*), pineland rayless goldenrod (*Bigelowia nudata subsp. nudata*), Seminole false foxglove (*Agalinis filifolia*), sugarcane plumegrass (*Saccharum giganteum*), knotroot foxtail (*Setaris parviflora*), sawtooth blackberry (*Rubus argutus*), and laurel greenbrier (*Smilax laurifolia*).

Pond pine swamp strand [WETLAND FORESTED MIXED], a wetland community that is typically dominated by pond pine, occurs on wetter, flat topography with acidic soils. The understory is dominated by gallberry and saw palmetto. Because of the dense shrub and tree canopies, the groundcover is sparse, except for sphagnum moss.

Mixed bay swamp strand [MIXED WETLAND HARDWOODS], a wetland community with flat to slightly sloping topography, may be inundated for up to 6 months per year. The tree canopy is dominated by sweetbay magnolia and loblolly bay (*Gordonia lasianthus*), but other wetland hardwoods are also present. The understory and groundcover plants are similar to those in the cypress swamp, except for bay species including sweetbay magnolia, loblolly bay, and red bay (*Persea palustris*) in the understory.

Oak hammock strand [MIXED WETLAND HARDWOODS] is a wetland community with flat to slightly sloping topography, which may be flooded for up to 6 months per year. The canopy is dominated by water oak (*Quercus nigra*). Other trees present include red maple (*Acer rubrum*), cabbage palm (*Sabal palmetto*), sweetbay magnolia, and live oak (*Quercus virginiana*). The understory is dominated by wax myrtle and also includes persimmon (*Diospyros virginiana*). The ground layer is characterized by a dense cover of mesic herbaceous species such as broomsedge (*Andropogon virginicus*) and bottlebrush threeawn (*Aristida spiciformis*).

The surrounding edges of the referenced swamp systems also support nonforested wetlands [FRESHWATER MARSHES, WET PRAIRIES, EMERGENT AQUATIC VEGETATION] and

MIXED SCRUB-SHRUB WETLANDS. FRESHWATER MARSHES are treeless, seasonally flooded wetlands, which are vegetated by emergent wetland species. While some areas of freshwater marsh are dominated by St. John's wort, most of the freshwater marsh is vegetated by a mixture of coinwort (*Centella asiatica*), sedges (*Cyperus surinamensis, C. spp.*), mermaid's weed (*Prosepinaca pectinata*), camphorweeds (*Pluchea spp.*), grassleaf arrowhead (*Sagittaria graminea*), beak sedges, marsh pennywort (*Hydrocotyle umbellata*), spike rush (*Eleocharis baldwinii*), lemon bacopa (*Bacopa caroliniana*), rushes (*Juncus marginatus, J. megacephalus, J. spp.*), marsh pink (*Sabatia grandiflora*), giant whitetop sedge, southern umbrellasedge (*Fuirena scirpoidea*), and tenangle pipewort. WET PRAIRIES, which are typically shallower than freshwater marshes, are vegetated by a variety of grasses and forbes such as wiregrass, blue maidencane, dichanthelium grasses (*Dichanthelium spp.*), colic root (*Aletris lutea*), sedges, and rushes. EMERGENT AQUATIC VEGETATION communities are deeper zones of freshwater marshes, which support the growth of both floating and partially or completely submerged vegetation. Floating white water lily (*Nymphaea odorata*) is an example of emergent aquatic vegetation. MIXED SCRUB-SHRUB WETLANDS are similar to marshes and wet prairies, except for the presence of a dense to moderately dense shrub layer of wax myrtle and/or willow (*Salix caroliniana*).

3.6 ECOLOGICAL RESOURCES

Under Bailey's (1995) classification system for the ecoregions of the United States, the proposed project site and environs lie in the Outer Coastal Plain Mixed Forest Province, which is 173,800 mile^2 in area. The province consists of the Atlantic and Gulf Coastal Plains, including all of Florida north of Lake Okeechobee. Along the Atlantic coast, the extensive coastal marshes and interior swamps are dominated by gum and cypress. Most upland areas are covered by subclimax pine forest, which has an understory of grasses and sedges called savannas. Undrained shallow depressions in savannas form upland bogs, in which evergreen shrubs predominate (Bailey 1995).

The region provides habitat for a wide variety of animals. Plant communities and animal species on the Stanton Energy Center site are described more fully in the sections below.

3.6.1 Terrestrial Ecology

Figure 3.5.1 displays the upland terrestrial vegetation and land cover types for the site and immediate vicinity (see Section 3.5.2 for an explanation of land use cover types). The land covers associated with the undeveloped portion of the site generally consist of typical central Florida uplands and wetlands. The predominant upland vegetation cover type is PINE FLATWOODS. Pine flatwoods are upland communities with flat to slightly sloping topography and well- to moderately well-drained soils. Pine flatwoods are fire climax communities (i.e., the plant community condition/seral stage is maintained by episodic fires). The pine flatwoods on the site are burned at periodic intervals to maintain their natural state. OUC hires a local control-burn consultant to conduct this maintenance. Longleaf pine (*Pinus palustris*) is the characteristic canopy tree species. The extremely open overstory allows development of a rich understory of shrubs and herbaceous species. Saw palmetto is the most abundant shrub. Other common shrub species include coastal plain staggerbush (*Lyonia fruticosa*), shiny lyonia, paw paw (*Asimina reticulata*), shiny blueberry (*Vaccinium myrsinites*), blue huckleberry (*Gaylussacia frondosa*), gopher apple (*Licania michauxii*), and gallberry. Wiregrass (*Aristida beyrichiana*) dominates the herbaceous layer but is accompanied by a diverse array of herbaceous species, such as black root (*Pterocaulon pycnostachyum*), roundpod St. John's-wort, white-topped aster (*Oclemna reticulatus*), grassleaf roseling (*Callisia graminea*), broomsedge, whitehead bogbuttons (*Lachnocaulon anceps*), yellow star grass (*Hypoxis lutea*), yellow and orange milkworts (*Polygala rugellii* and *P. lutea*), bracken fern (*Pteridium aquilinum*), and Adam's needle (*Yucca filamentosa*).

Other upland vegetation cover types adjacent to the Stanton Energy Center include IMPROVED PASTURE, HERBACEOUS UPLAND NONFORESTED, SHRUB AND BRUSHLAND, and MIXED UPLAND NONFORESTED. IMPROVED PASTURE is land that has been cleared, tilled, reseeded with forage grasses, and managed for livestock grazing. Bahia grass (*Paspalum notatum*) is the dominant forage grass cover.

HERBACEOUS UPLAND NONFORESTED communities are areas of former pasture, which were abandoned and are being reclaimed by native grasses and other pioneer vegetation. These open, grassy areas within pine flatwoods may contain occasional longleaf pine or pond pine in the canopy, and shrubs such as wax myrtle, groundsel (*Baccharis halimifolia*), and gallberry in the understory. The ground layer consists of a mixture of native grasses, forbes, composites, legumes, and other typical flatwoods vegetation such as broomsedge, slender goldenrod (*Euthamia caroliniana*), bahia grass, common carpetgrass (*Axonopus furcatus*), camphorweeds, black root, dog fennel (*Eupatorium capillifolium*), ticktrefoil (*Desmodium incanum*), oakleaf fleabane (*Erigeron quercifolius*), greenbrier (*Smilax auriculata*), climbing hempvine (*Mikania scandens*), prickley pear cactus (*Opuntia humifusa*), and Nuttall's thistle (*Cirsium nutallii*).

SHRUB AND BRUSHLAND communities include treeless areas dominated by one or more species of shrubs, such as saw palmetto (the most prevalent), wax myrtle, and gallberry. For areas in which saw palmetto is dominant, this community type resembles pine flatwoods without the pine canopy.

MIXED UPLAND NONFORESTED communities may include occasional longleaf pine in the overstory. Understory layers consist of a moderately dense shrub layer and open ground layer. The shrub layer is typically dominated by wax myrtle. Other shrub layer species can include groundsel, shiny lyonia, shiny blueberry, Darrow's blueberry (*Vaccinium darrowii*), and gallberry. Due to shading from the shrub layer, the ground vegetation is typically not dense. Typical ground level plants include needlepod rush (*Juncus scirpoides*), orange and yellow milkworts, Elliott's milkpea (*Galactia elliottii*), whitehead bogbuttons, wiregrass, fourpetal St. John's-wort (*Hypericum tetrapetalum*), yellow star grass, broomsedge, black root, vanilla leaf (*Carphephorus odoratissimus*), ticktrefoil, pink sundew (*Drosera capillaris*), gopher apple, St. Andrew's-cross (*Hypericum hypericoides*), Mohr's thoroughwort (*Eupatorium mohrii*), and occasional club-mosses (*Lycopodiella* spp.) and lichens such as reindeer moss (*Cladonia* sp.).

The nonvegetated areas of the site currently consist of power plant-related features, including the power plant facilities, substation facilities, and access roads; transmission lines; and solid waste disposal areas.

Wildlife species that are common to central Florida are found on the Stanton Energy Center site. As expected with a large acreage site containing many upland and wetland habitats, species assemblages are diverse, and types of species are high in number. Except for perhaps the Florida black bear (Section 3.6.3), the whitetail deer is the only large indigenous mammal. Common small mammals include raccoons, opossums, flying squirrels, rabbits, and numerous species of ground-dwelling rodents. Bobwhite and turkey are the principal game birds. Migratory waterfowl and nongame bird species are numerous. Winter birds are diverse and numerous. Many species of reptiles are also present.

3.6.2 Aquatic Ecology

The Stanton Energy Center site contains no appreciable natural aquatic resources (e.g., lakes, rivers, or streams), although some manmade ponds occur within the developed portion. The nearest major aquatic resource is the Econlockhatchee River, approximately 1 mile to the east of the site. This river is in the St. Johns River Water Management District's Econlockhatchee subbasin, which is part of the Middle St. Johns River Basin. The watershed for the Econlockhatchee River (excluding the Little Econlockhatchee River) is about 38 miles long and 25 miles wide, covering part of Orange and Seminole counties. The waterbody is identified as a blackwater river system, characterized by nearly level topography, poorly-drained soils, and scattered swamps with limited flow. The Econlockhatchee River is designated as an "Outstanding Florida Water" (Section 62-302.700, F.A.C.).

For water use, the Econlockhatchee River and its tributaries are categorized as Class III (i.e., designated for recreation, and propagation and maintenance of a healthy, well-balanced population of fish and wildlife). The stretch of the river nearest to the Stanton Energy Center has had biological water quality violations centered on high fecal coliform counts, probably due to extensive cattle ranching operations to the south, upstream of the site.

Water quality improves downstream to the north of the site, where the stream supports a large and diverse macroinvertebrate community and freshwater fisheries population. The river is a popular fishing location. However, in order to lower potential human risk resulting from mercury in fish, the Florida Department of Health (2005) lists a "no consumption" warning for largemouth bass, gar, and bowfin in the Econlockhatchee River. These species are typically predatory in nature and would accumulate mercury in their systems more than other popular sport fish, such as panfish.

3.6.3 Threatened and Endangered Species

Extensive surveys for federal- and state-listed threatened and endangered species have been conducted in support of the two existing Site Certification Applications for the site and the Environmental Resources Permit application for Unit A. Additionally, OUC is required to conduct periodic monitoring of one endangered species, the red-cockaded woodpecker (*Picoides borealis*), which has several colonies on the Stanton Energy Center site. Table 3.6.1 lists the threatened and endangered species that have been documented on or near the site and their current protected status. No federally-listed threatened or endangered plant species are located on or near the site. The special status plants cited in Table 3.6.1 are all protected under the Florida Department of Agriculture and Consumer Services, which guards against overharvesting by collectors. Of the nine listed species, five were found growing along or in the vicinity of the proposed electrical transmission line corridor (Section 4.1.6.3): Catesby's lily (pine lily) (*Epidendrum conopseum*), cinnamon fern (*Osmunda cinnamomeai*), royal fern (*Osmunda regalis*), yellow-flowered butterwort (*Pinguicula lutea*), and hooded pitcher plant (*Tillandsia utriculata*).

Of the wildlife species listed in Table 3.6.1, the eastern indigo snake, Florida pine snake, gopher tortoise, bald eagle, Florida scrub jay, red-cockaded woodpecker, and Sherman's fox squirrel have been documented on the site by past ecological surveys. Kirtland's warbler has not been observed on the site, but possibly could be seen during winter migration. The southeastern kestrel has not been positively identified on the site, although the more common northern migrant has been observed. The Florida black bear has not been observed, although it has been recorded along riverine systems to the east of the property.

The red-cockaded woodpecker is well documented on the site. It may forage in the northern buffer area, but its nesting clans (i.e., groups containing two to nine birds but only a single breeding pair) are all located to the south or east of the existing power plant facilities. The most sensitive habitat type on the site is probably that of the red-cockaded woodpecker nesting clusters. These locations are all south and east of the existing facilities, in habitats about 1,500 ft or more from the proposed construction area (DeLotelle and Guthrie, Inc. 2003).

An eagle nest formerly was located on the property approximately 0.5 mile southeast of the proposed facilities, but was destroyed by hurricanes in 2004. The current location of those eagles is unknown. However, during site reconnaissance in May 2005, an immature eagle was observed in the northern buffer area. Another eagle nest is located off the site approximately 0.5 mile west of the western property boundary and, therefore, more than 1.5 mile from the site of the proposed facilities.

No wading bird colonies are known to exist at the Stanton Energy Center (FWC 2005), although various species, including the threatened wood stork, are likely to forage on the property. Wood storks were observed on the site during the May 2005 site reconnaissance, and snowy egrets have been observed in the proposed electrical transmission line corridor. Florida sandhill cranes, a threatened species, are commonly seen on the site and have become accustomed to human presence.

Table 3.6.1. Threatened and endangered species documented on or near the Stanton Energy Center site.

Common name	Scientific name	Status FWS[a]	FWC[b]	FDACS[c]
		Plants		
Greenfly orchid	*Epidendrum conopseum*			C[d]
Catesby's lily (pine lily)	*Lilium catesbei*			T[e]
Cinnamon fern	*Osmunda cinnamomea*			C
Royal fern	*Osmunda regalis*			C
Yellow-flowered butterwort	*Pinguicula lutea*			T
Rose pogonia	*Pogonia ophioglossoides*			T
Hooded pitcher plant	*Sarracenia minor*			T
Common wild pine	*Tillandsia fasiculata*			E[f]
Giant wild pine	*Tillandsia utriculata*			E
		Animals		
		Reptiles		
Eastern indigo snake	*Drymarchon corais couperi*	T	T	
Gopher tortoise	*Gopherus polyphemus*		SSC[g]	
Florida pine snake	*Pituophis melanoleucus mugitus*		SSC	
		Birds		
Florida scrub jay	*Aphelocoma coerulescens*	T	T	
Kirtland's warbler (migrant)	*Dendroica kirtlandii*		E	
Snowy egret	*Egretta thula*		SSC	
Southeastern kestrel	*Falco sparverius paulus*		T	
Florida sandhill crane	*Grus Canadensis pratensis*	T		
American bald eagle	*Haliaeetus leucocephalus*	T	T	
Wood stork	*Mycteria americana*	E	E	
Red-cockaded woodpecker	*Picoides borealis*	E	SSC	
		Mammals		
Sherman's fox squirrel	*Sciurus niger shermani*		SSC	
Florida black bear	*Ursus americanus floridanus*		T	

[a]FWS = U.S. Fish and Wildlife Service
[b]FWC = Florida Fish and Wildlife Conservation Commission
[c]FDACS = Florida Department of Agriculture and Consumer Services
[d]C = commercially exploited
[e]T = threatened
[f]E = endangered
[g]SSC = species of special concern
Sources: FWC 2004; FWS 2005.

3.6.4 Biodiversity

Biodiversity is a general term broadly defined as the variety and variability of life, or the diversity of genes, species, and ecosystems (CEQ 1993). Its components or levels include regional ecosystem diversity, local ecosystem diversity, species diversity, and genetic diversity (CEQ 1993). At all of these levels, the existing biodiversity is high within the Stanton Energy Center environs (i.e., it lies within a regional matrix of diverse ecosystems containing a great variety of species and genotypes). However, biodiversity surrounding the site and throughout the region has decreased due to human population pressure and concurrent clearing of land, habitat fragmentation, and alteration of the hydrological regime from extensive development.

3.7 SOCIAL AND ECONOMIC RESOURCES

This section contains data on the social and economic resources most likely to be affected by construction and operation of the proposed facilities. Most of the data pertain to Orange County, but some data are also included for the city of Orlando because it is the largest municipality in the county and could be the destination of workers relocating to the area for jobs associated with construction or operation of the facilities.

3.7.1 Population

Table 3.7.1 provides population data for the city of Orlando and Orange County. Between 1990 and 2000, both jurisdictions experienced a large population increase, with Orange County growing by over 32%. The U.S. Census Bureau's 2004 population estimates for Orlando and Orange County indicate that the two jurisdictions have continued to grow at a rapid pace since 2000. The Bureau of Economic and Business Research at the University of Florida projects that Orange County's total population will increase to over 1.25 million by 2015, and to over 1.49 million by 2015 (BEBR 2003).

Table 3.7.1. Population data for the city of Orlando and Orange County

	1990 population	2000 population	Percent change 1990–2000	2004 population (estimate)	Percent change 2000–04
City of Orlando	164,674	185,951	12.9	205,648	10.6
Orange County	677,491	896,344	32.3	989,926	10.4

Source: U.S. Census Bureau 2005.

3.7.2 Employment and Income

The U.S. Census Bureau estimates that Orange County had a civilian labor force of 528,779 workers and an unemployment rate of 7.4% (39,328 workers) in 2004. This estimated unemployment rate was similar to that for both the state of Florida (7.1%) and the United States (7.2%) for the same year. Table 3.7.2 lists the major industries in terms of employment in Orange County in 2004 (U.S. Census Bureau 2005).

Table 3.7.2. Employment estimates by industry or economic sector in Orange County in 2004

Industry	Number	Percent of total
Arts, entertainment, and recreation; accommodation and food services	86,326	17.6
Educational services, health care, and social assistance	71,372	14.6
Professional, scientific, and management; administrative and waste management services	68,065	13.9
Retail trade	51,084	10.4
Finance and insurance; real estate and rental and leasing	42,951	8.8
Construction	35,838	7.3
Manufacturing	31,509	6.4
Transportation and warehousing; utilities	25,913	5.3
Other services, except public administration	25,155	5.1
Information	17,643	3.6
Wholesale trade	16,472	3.4
Public administration	14,730	3.1
Agriculture, forestry, fishing and hunting, and mining	2,393	0.5

Source: U.S. Census Bureau 2005.

The largest employer in Orange County is the Walt Disney Company with over 53,800 employees. Other employers in Orange County with more than 10,000 employees include Florida Hospital/Adventist Health System (19,270), Wal-Mart Stores, Inc. (16,757), Publix Super Markets, Inc. (15,606), Universal Orlando (12,500), and Orlando Regional Healthcare System (11,093) (Metro Orlando Regional Development Commission 2005).

The Stanton Energy Center has 204 full-time employees, of which 183 operate Units 1 and 2 and 21 operate Unit A. In addition, about 100 contractor personnel are likely to be on the site at any given time.

Estimated per capita income and median household income in Orange County were $22,722 and $44,490, respectively, in 2004. Orange County's estimated per capita income was lower than that for both the state of Florida ($23,532) and the United States ($24,020). The county's estimated median household income was higher than that for Florida ($41,236), but slightly lower than that for the United States ($44,684) (U.S. Census Bureau 2005).

3.7.3 Housing

Table 3.7.3 provides housing data for Orange County in 2000 and 2004. The county's housing stock was increased by over 13% during that period to meet demand created by the rapid population increase discussed in Section 3.7.1. During the same period, both homeowner and rental vacancy rates in the county dropped. The estimated 2004 homeowner and rental vacancy rates in Orange County (1.2% and 6.0%, respectively) were lower than those for the state of Florida (1.6% and 9.9%). The estimated 2004 median value of owner-occupied housing and median monthly rent in Orange County ($149,999 and $797, respectively) were slightly higher than those for Florida ($149,291 and $766).

Table 3.7.3. Housing data for Orange County

	2000	2004 (estimate)
Total housing units	361,349	409,685
Occupied units	336,286	376,160
Vacant units	25,063	33,525
Homeowner vacancy rate (%)	1.7	1.2
Rental vacancy rate (%)	7.1	6.0
Median value, owner-occupied ($)	107,500	149,999
Median monthly rent, renter-occupied ($)	699	797

Source: U.S. Census Bureau 2005.

3.7.4 Public Services

3.7.4.1 Water and Wastewater Services

OUC provides water service for residents and businesses within the city of Orlando and portions of Orange County. OUC operates eight water treatment facilities that produce almost 30 billion gal of water annually, which is distributed to nearly 365,000 customers (OUC 2005). The city of Orlando's Public Works Department provides wastewater service for residents and businesses within the city of Orlando and portions of Orange County. The Wastewater Department operates three wastewater treatment facilities with the combined capacity to process over 72 million gal per day (City of Orlando 2005).

The Orange County Utilities Department provides water and wastewater services for most of the unincorporated areas of Orange County. The Department's Water Division operates 13 water treatment facilities that produce over 20 billion gal of water annually, which is distributed to more than 121,000 customers. The Department's Water Reclamation Division operates three regional wastewater treatment facilities with the combined capacity to process over 69 million gal per day (Orange County 2005a).

3.7.4.2 Police Protection

In Orange County, police protection is provided by a combination of municipal police departments in the incorporated areas and the Orange County Sheriff's Office countywide. The Orange County Sheriff's Office, which has over 1,340 sworn officers, provides police protection in the unincorporated area around the Stanton Energy Center with 65 officers stationed at the Sector 2 substation.

3.7.4.3 Fire Protection and Emergency Medical Services

Fire protection and emergency medical services in Orange County are provided by a combination of municipal fire departments in the incorporated areas and the Orange County Fire Rescue Department (OCFRD) in unincorporated areas. The OCFRD has over 900 emergency response personnel and handled over 86,000 emergency calls in 2004 (Orange County 2005b). Fire protection and emergency medical services in the unincorporated area around the Stanton Energy Center are provided by OCFRD's Station 85, which is staffed by six firefighters and equipped with both firefighting and rescue vehicles. Additional responding stations in the area include OCFRD Station 80 and Station 83, which has hazardous materials facilities.

3.7.4.4 Schools

Public education in Orange County is provided by the Orange County Public School District, which operates 108 elementary schools, 29 middle schools, and 17 high schools. The District also operates three K-8 grade schools, six ninth grade centers, four technical education centers, 24 alternative education facilities, and five exceptional education facilities. In May 2005, the District had a total enrollment of 173,334 students, with 80,170 in elementary schools, 38,821 in middle schools, 47,485 in high schools, and 6,858 in special schools. Current enrollment exceeds current capacity in each of these school categories (but not necessarily in each school within the categories). Specifically, the elementary schools are at 132% of capacity, the middle schools are at 136% of capacity, and the high schools are at 105% of capacity (capacity figures are not provided for the special schools). However, with the passage of a recent sales tax referendum, the District is implementing a plan to renovate or replace 136 of its schools. The District anticipates that these renovated and new schools will provide excess capacity by the 2010–11 school year (Orange County Public School District 2005).

3.7.4.5 Health Care

The hospital nearest the Stanton Energy Center is the Florida Hospital East Orlando, a 144-bed full-service community hospital with a 24-hour emergency department. The largest hospitals in Orange County are the Florida Orlando Hospital (an 881-bed acute care community hospital) and the Orlando Regional Medical Center (a 517-bed tertiary care center).

3.7.5 Local Government Funds and Expenditures

In its fiscal year 2005 budget, Orange County projected that it would have total funds of over $2.5 billion from the sources listed in Table 3.7.4. Projected expenditures totaling over $2.5 billion from the fiscal year 2005 budget are listed in Table 3.7.5 (Orange County 2005b).

Table 3.7.4. Projected funds in Orange County's fiscal year 2005 budget

Revenues	
Ad valorem taxes	$588,464,140
Sales and use taxes	226,309,000
Franchise taxes	6,205
Licenses and permits	23,017,891
Intergovernmental revenue	219,920,891
Charges for services	289,111,023
Fines and forfeitures	3,865,706
Court related revenue	7,966,980
Interest and profits on investments	11,352,593
Miscellaneous revenues	190,689,665
Non-revenue funds	
Bond/loan proceeds	$330,000
Interfund transfers	328,265,120
Internal service charges	96,799,064
Fund balance	602,245,203

Source: Orange County 2005b.

Table 3.7.5. Projected expenditures in Orange County's fiscal year 2005 budget

Expenditures/expenses	
General government	$180,651,495
Public safety	468,734,304
Physical environment	272,290,881
Transportation	191,907,889
Economic environment	129,441,780
Human services	181,450,602
Internal services	141,426,831
Culture and recreation	53,628,121
Non-expense disbursements	
Debt service	$131,468,103
Reserves	433,994,170
Interfund transfers	328,265,120

Source: Orange County 2005b.

OUC is exempt from paying property taxes in Orange County. However, Southern Company Florida, LLC, has a 65% equity ownership interest in Stanton Unit A, and pays Orange County property taxes on its ownership share of Unit A. For the 2004 tax year, Southern Company Florida paid over $2.4 million in local taxes (Table 3.7.6).

Table 3.7.6. Taxes paid by Southern Company Florida, LLC, in Orange County in 2004

Tax type	Amount
General county	$677,745
School	990,180
Library	57,680
St. Johns River Water Management District	60,084
County fire	338,872
Unincorporated tax district	278,789

3.7.6 Environmental Justice

Table 3.7.7 lists the percentages of the total population that are classified as "minority" and "below poverty level" for the United States, the state of Florida, Orange County, the census tract[1] in which the Stanton Energy Center is located (i.e., Census Tract 167.22), and the six census tracts surrounding Census Tract 167.22 (all of which have their nearest boundary within 7 miles of the power plant). The data in Table 3.7.7 are from the 2000 U.S. Census, the most recent year for which complete data are available at the census tract level. As indicated in Table 3.7.7, Orange County and most of the seven census tracts have higher minority percentages than the state of Florida and the United States. Census Tract 167.22, which includes the population of the Florida Department of Corrections' Central Florida Reception Center, has a slightly higher minority percentage than Orange County, and a much higher minority percentage than Florida and the United States. Conversely, Orange County and six of the seven census tracts have lower percentages of people below the poverty level than the state of Florida and the United States. Census Tract 167.22 has a much lower percentage of people below the poverty level than Orange County, the state of Florida, and the United States.

Table 3.7.7. Environmental justice data for the United States, Florida, Orange County, and seven census tracts near the Stanton Energy Center

Location	Percent minority[a]	Percent below poverty level[b]
United States	30.9	12.4
Florida	34.6	12.5
Orange County	42.5	12.1
Census tracts surrounding the Stanton Energy Center		
Census Tract 166.02	19.1	16.3
Census Tract 167.04	7.2	2.7
Census Tract 167.10	42.4	1.4
Census Tract 167.11	42.8	7.7
Census Tract 167.18	46.3	9.8
Census Tract 167.19	33.7	5.4
Census Tract 167.22 (includes Stanton Energy Center)	45.7	3.5

[a]Includes all persons who identified themselves as not "White alone," plus those who identified themselves as both "White alone" and "Hispanic or Latino."

[b]Represents individuals below the poverty level as defined by the U.S. Census Bureau.

Source: U.S. Census Bureau. 2005.

[1] As defined by the U.S. Census Bureau, census tracts are small, relatively permanent statistical subdivisions of a county. Census tracts, which average about 4,000 inhabitants, are designed to be relatively homogeneous units with respect to population characteristics, economic status, and living conditions.

3.7.7 Transportation

3.7.7.1 Roads

Road access to the Stanton Energy Center is primarily via Alafaya Trail from either Highway 408 (East-West Expressway) or Curry Ford Road, and secondarily via Avalon Park Boulevard from Highway 50 (Figure 3.7.1). Limited ingress/egress is currently allowed from/to the south via an access road connected to the BeeLine Expressway.

Most traffic enters the Stanton Energy Center from the north via Alafaya Trail, a two-lane road classified as a minor arterial in the Orange County functional classification system. In 2003, average daily traffic on the link of Alafaya Trail between Curry Ford Road and the Stanton Energy Center was 24,775 vehicles, with an afternoon peak hour count of 1,971 vehicles (999 vehicles northbound and 972 vehicles southbound). Because it is a two-lane road with such heavy traffic volume, this segment of Alafaya Trail currently operates at an “F” level-of-service during the peak period, which is the lowest possible rating (Myrna Bark, Orange County Traffic Engineering Department, personal communication to Darren Stowe, Environmental Consulting & Technology, Inc., May 11, 2005). Level-of-service is defined as a “qualitative measure describing operational conditions within a traffic stream, based on service measures such as speed and travel time, freedom to maneuver, traffic interruptions, comfort, and convenience” (TRB 2000). An “F” level-of-service, which is used to define forced or breakdown traffic flow, exists:

> “wherever the amount of traffic approaching a point exceeds the amount which can traverse it and queues begin to form. Operations within the queue are characterized by stopping and starting. Over and over, vehicles may progress at reasonable speeds for several hundred feet or more, and then be required to stop. Level-of-service F is used to describe operating conditions within the queue, as well as the point of the breakdown. It should be noted, however, that in many cases, once free of the queue, traffic may resume to normal conditions quite rapidly” (TRB 2000).

Although limited access to the Stanton Energy Center is available from the south via the BeeLine Expressway, this southern access is rarely used except for occasional trips by power plant staff. Thus, almost all traffic to and from the Stanton Energy Center uses Alafaya Trail, thereby contributing to the heavy traffic volume on that road. Under the current shift change schedule, the maximum number of vehicle trips in or out of the power plant property is about 135 vehicles during the peak hour of the afternoon shift change. In addition, an estimated 90 trucks make roundtrip runs to the Stanton Energy Center via Alafaya Trail each day.

The current level-of-service on Alafaya Trail and the approved future development in the area (Section 3.1.2) are major reasons for two planned road improvement projects, which would allow residential and industrial development to proceed in this part of Orange County. These road projects are discussed in this section because activities associated with their construction are likely to be part of the affected environment prior to construction of the proposed facilities. For the first project, private developers have provided design work, construction plans, and permitting to extend the

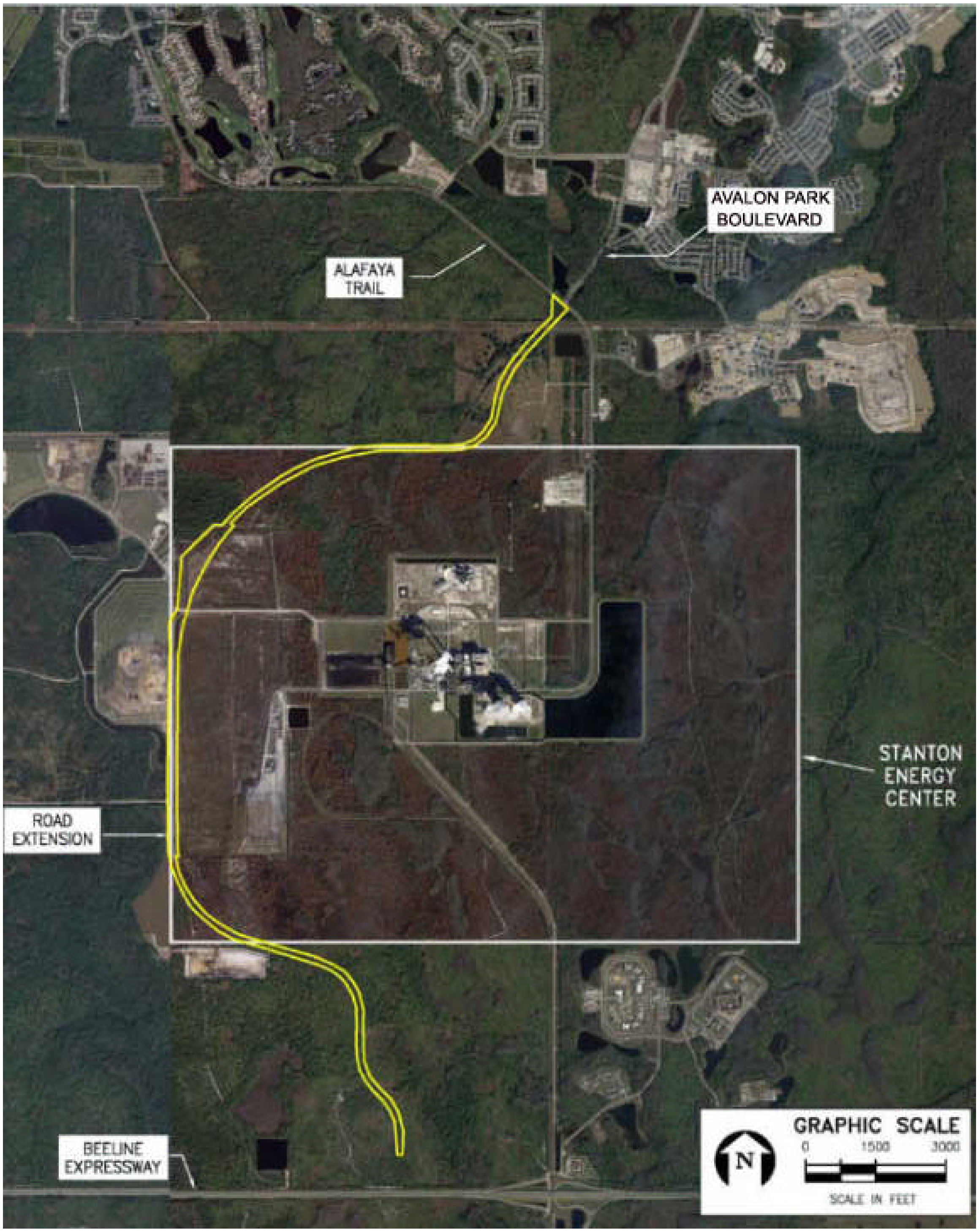

Figure 3.7.1. Planned route of the Avalon Park Boulevard extension (yellow lines).

existing Avalon Park Boulevard, which currently ends at its intersection with Alafaya Trail just north of the Stanton Energy Center. This four-lane extension (also known as Innovation Way) would run westward and southward along the western boundary of the Stanton Energy Center to form a new interchange with the BeeLine Expressway (Figure 3.7.1), and then southward to International Corporate Park.

Orange County plans to commence construction of the Avalon Park Boulevard extension in mid-2006 and to complete the project within 24 months, pursuant to an agreement with the private developer of International Corporate Park. When completed, the Avalon Park Boulevard extension would link primarily residential developments with the proposed, large-scale International Corporate Park, which is expected to create a large volume of commuter traffic. The northern section of this extension, which would begin at the intersection of Avalon Park Boulevard and Alafaya Trail, is intended to help reduce traffic volume on Alafaya Trail.

For the second planned road improvement project, private developers have provided funding to widen Alafaya Trail from two to four lanes from Avalon Park Boulevard north to Curry Ford Road. Orange County plans to complete this expansion in 2009 or 2010. The widening of Alafaya Trail to four lanes would allow for planned development in Avalon Park and the approved Morgan Planned Development.

3.7.7.2 Railways

Rail access to the Stanton Energy Center is from the south via an existing rail spur provided by CSX Transportation, Inc. The rail spur is used to deliver coal to the existing Units 1 and 2, with five train loads delivered in a typical week.

3.7.8 Cultural Resources

According to a recent review of the Florida Master Site File, four previously recorded archaeological sites and no historical structures are located within the boundaries of the Stanton Energy Center. Figure 3.7.2 depicts the location of these sites (OR 255, OR 256, OR 383, and OR 384) relative to disturbed areas within the power plant property. The four archaeological sites were found by personnel from the Florida Secretary of State (Division of Archives, History, and Records Management) during an archaeological and historic survey of the Stanton Energy Center property, which was conducted in 1981 in coordination with the construction of Unit 1. The Division of Archives, History, and Records Management concluded that the sites did not represent significant archaeological resources, and that the construction and operation of Units 1 and 2 within the certified area would not adversely affect any significant archaeological or historical resources (OUC 2001).

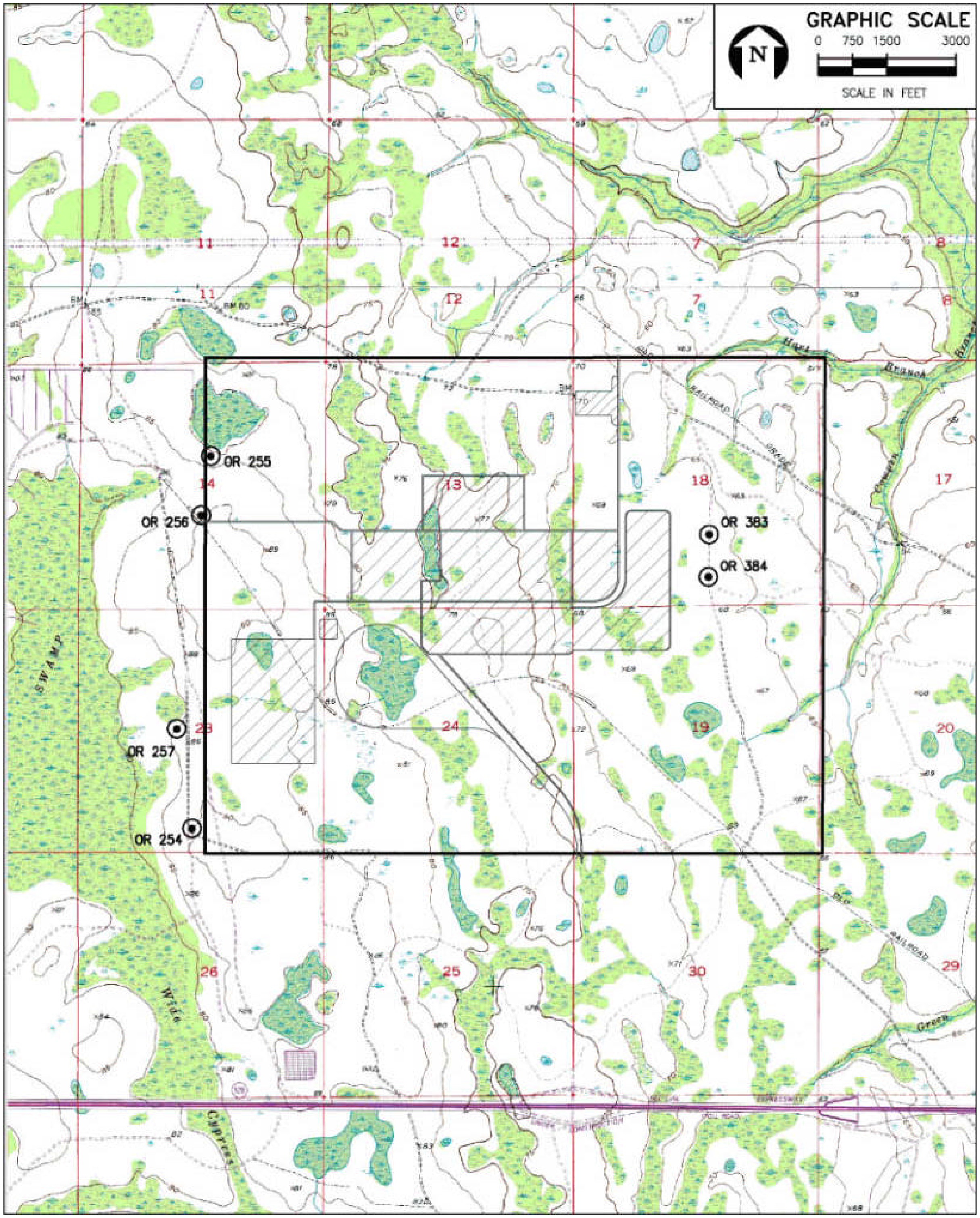

Figure 3.7.2. Location of archaeological sites within the boundaries of the Stanton Energy Center (OR 255, OR 256, OR 383, and OR 384).

3.8 WASTE MANAGEMENT

On the western side of the Stanton Energy Center property, a 347-acre area is permitted by the state of Florida for use as a coal-combustion ash landfill. The principal type of waste disposed in this onsite landfill is sludge generated by the Unit 1 and Unit 2 scrubbers that remove sulfur from the flue gas. Prior to disposal, scrubber sludge is blended with coal-combustion ash from Units 1 and 2 at an approximate ratio of one part ash to two parts sludge. The resulting blend forms a stable concrete-like solid material. Solid residues from water treatment are also taken to the landfill for disposal.

The landfill, which is entirely above natural grade, extends up to a permitted final height of 155 ft above grade. To prevent rain infiltration and leakage to groundwater, the landfill base and final cap are constructed from sludge material blended with ash to achieve a very low permeability (10^{-7} cm/sec or less). Capped portions of the landfill are topped with a layer of soil and vegetated with grasses and sedges.

The onsite landfill receives slightly more than 500,000 tons (wet weight) of blended ash and scrubber sludge annually. In addition, about 180,000 tons of coal-combustion ash from Units 1 and 2 is sold annually for beneficial reuse (e.g., as construction material). As of 2004, the landfill has received a total of 3,911,000 yd^3 of waste material. Approximately 25 acres of the landfill have reached final grade, another 12 acres are in active use for disposal, and the remaining permitted acres are available for future use. Most municipal solid waste in the region is sent to the Orange County Sanitary Landfill for disposal. This county-operated landfill, located adjacent to the western boundary of the Stanton Energy Center property, is permitted for disposal of Class I and Class III solid waste. Class I waste is nonhazardous solid waste, excluding liquids and sludges, while Class III waste includes yard trash, construction and demolition debris, asbestos, paper, glass, and similar materials. Since 1972, this landfill has received more than 20 million tons of waste. In fiscal year 2005, the landfill received 1.35 million tons of waste for disposal. Although landfill operating permits are issued only for 5-year periods, the county has received conceptual approval of plans to provide waste capacity sufficient for approximately the next 20 years. The landfill property is estimated to have sufficient land to provide disposal capacity for approximately the next 50 years.

Stanton Energy Center process wastewater is treated on the site and used within the facilities. Units 1 and 2 have an onsite wastewater treatment plant, while Unit A has onsite septic systems and drain fields. Sanitary wastewater from onsite showers, lavatories, and similar uses is collected and routed to the septic systems and drain fields. No liquid effluent is discharged off the site. Sanitary sewage and other municipal wastewaters from the surrounding area are treated at the nearby Orange County Eastern Water Reclamation Facility, which has a daily capacity of 19 million gal.

Hazardous waste management services are available through an Orange County contractor that is contractually required to provide services to local businesses at the same rates as paid by the county. Hazardous waste is transported to a processing facility in Tampa, Florida.

3.9 HUMAN HEALTH AND SAFETY

3.9.1 Air Quality and Public Health

3.9.1.1 Background

The quality of ambient air plays an important role in the health of the public. Exposure to pollutants is associated with numerous effects on human health, including increased respiratory symptoms, hospitalization for heart or lung diseases, and even premature death. Children are particularly vulnerable to environmental influences because of their narrow airways and rapid respiration rate. Compared to adults, children's fast metabolism, ongoing physical development, and daily behavior place them at increased risk from exposure to environmental pollutants. A recent World Health Organization review (WHO 2003) concluded that the body of epidemiological evidence was sufficient to assign causality for mortality and morbidity to various forms of outdoor air pollution.

Vehicle emissions, fossil-fuel combustion, chemical manufacture, and other sources add gases and particles to the air people breathe. The Clean Air Act required the EPA to set National Ambient Air Quality Standards (NAAQS) for six pollutants considered harmful to public health and the environment:

- **Particulate Matter (PM-10)/ Fine Particulate Matter (PM-2.5):** Many scientific studies have linked breathing particulate matter to a series of health problems, including aggravated asthma, increases in respiratory symptoms (e.g., coughing and difficult or painful breathing), chronic bronchitis, decreased lung function, and premature death.
- **Sulfur Dioxide (SO_2): SO_2** causes a wide variety of health and environmental impacts because of the way it reacts with other substances in the air. When SO_2 reacts with other chemicals in the air to form tiny sulfate particles that are breathed, they gather in the lungs and are associated with increased respiratory symptoms and disease, difficulty in breathing, and premature death. Particularly sensitive groups include people with asthma who are active outdoors, and children, the elderly, and people with heart or lung disease.
- **Carbon Monoxide (CO):** The health threat from lower levels of CO is most serious for those who suffer from heart disease (e.g., angina, clogged arteries, or congestive heart failure). For a person with heart disease, a single exposure to CO at low levels may cause chest pain and reduce that person's ability to exercise; repeated exposures may contribute to other cardiovascular effects. Even healthy people can be affected by high levels of CO. People who breathe high levels of CO can develop vision problems, reduced ability to work or learn, reduced manual dexterity, and difficulty performing complex tasks. At extremely high levels, CO is poisonous and can cause death.

- **Nitrogen Dioxide (NO_2):** NO_2 or its reaction products have effects on breathing and the respiratory system, may cause damage to lung tissue, and may result in premature death. Small particles formed from NO_2 penetrate deeply into sensitive parts of the lungs and can cause or worsen respiratory disease such as emphysema and bronchitis, and aggravate existing heart disease.
- **Ozone (O_3):** Ground-level ozone triggers a variety of health problems including aggravated asthma, reduced lung capacity, and increased susceptibility to respiratory illnesses like pneumonia and bronchitis.
- **Lead (Pb):** Lead causes damage to the kidneys, liver, brain and nerves, and other organs. Exposure to lead may also lead to osteoporosis (brittle bone disease) and reproductive disorders. Excessive exposure to lead causes seizures, mental retardation, behavioral disorders, memory problems, and mood changes. Low levels of lead damage the brain and nerves in fetuses and young children, resulting in learning deficits and lowered intelligence. Lead exposure causes high blood pressure and increases heart disease, especially in men. Lead exposure may also lead to anemia.

Air quality in Orange County and the surrounding region is described in Section 3.2.2.

3.9.1.2 Asthma

Asthma, a disease of the immune system, has a disproportionate effect on children, persons with pre-existing cardiopulmonary conditions, and certain minorities. Asthma is a common chronic disease of childhood, affecting over 4.4 million children in the United States and contributing to over 10 million missed school days annually. Although the cause of asthma is uncertain, indoor and outdoor air quality is believed to be a major contributor to pediatric asthma, and particulate matter exacerbates or induces asthmatic attacks (Environmental Research Foundation 1994). In 2003, the self-reported prevalence of asthma among children in Florida was 9.5%, compared to 8.8% in the United States (National Center for Health Statistics 2003). Asthma is also the leading work-related lung disease, with as much as 20% of adult-onset asthma being work related. In 2003, the self-reported prevalence of asthma among adults in Orange County was 10.8%, compared to 7.7% in the United States.

Asthma-related mortality rates in the United States and asthma-related hospitalization rates in Florida generally decreased during the 1990s (Figure 3.9.1). However, more recent data for asthma hospitalizations in Florida show a reversal of this earlier trend (Figure 3.9.2).

Orange County's chronic disease profile is presented in Table 3.9.1, which includes asthma under the chronic lower respiratory diseases section. Both the percentage of adults with asthma and the asthma hospitalization rates for Orange County are within the middle 50% range of Florida counties.

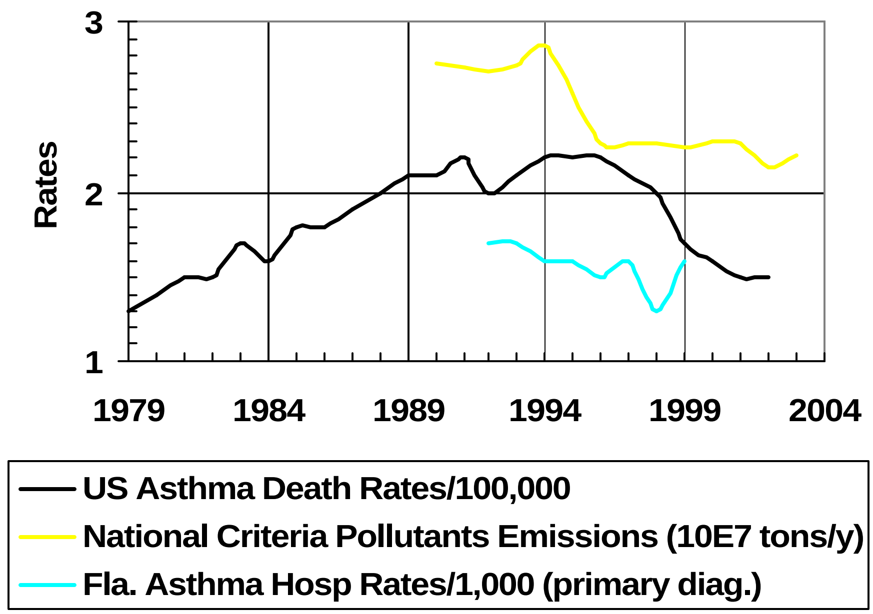

Figure 3.9.1. Asthma trends in the United States and Florida.

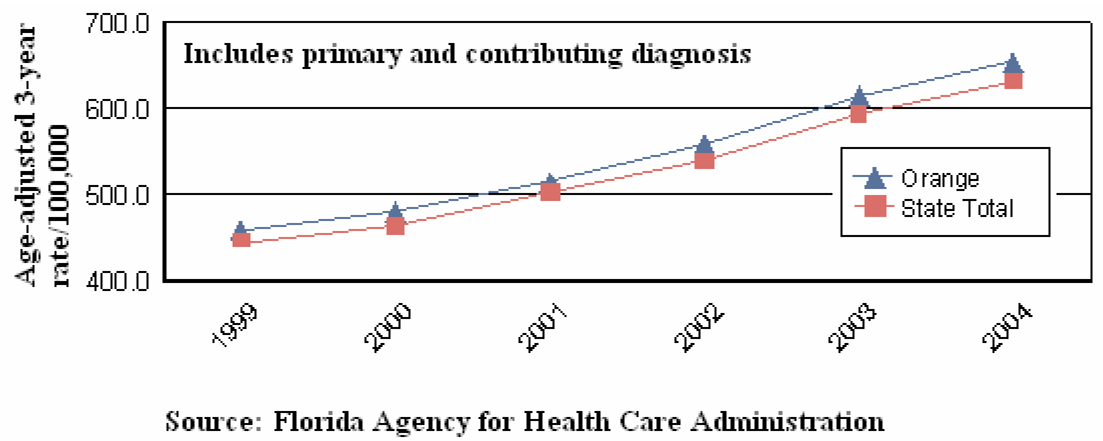

Figure 3.9.2. Recent hospitalization rates in Orange County and Florida due to asthma.

Table 3.9.1. Orange County chronic disease profile

Orange County Chronic Disease Profile

Indicator	Year(s)	Avg. Annual Number of Events	Age-Adjusted Rate[1]	Quartile[2]	State Age-Adjusted Rate
Coronary Heart Disease					
Deaths	2001-03	1,263	166.4	2	166.7
Hospitalizations	2001-03	6,215	747.1	3	748
Stroke					
Deaths	2001-03	367	48.3	2	44.7
Hospitalizations	2001-03	3,041	375.8	4	345.2
Heart Failure					
Deaths	2001-03	94	12.9	3	7.4
Hospitalizations from congestive heart failure	2001-03	2,919	363.3	3	319.8
Lung Cancer					
Deaths	2001-03	423	52.5	1	53.6
Incidence	2000-02	584	74.7	NA	73.9
Percent of Adults who currently smoke	2002		21.40%	2	22.20%
Colorectal Cancer					
Deaths	2001-03	145	18.2	3	17.3
Incidence	2000-02	407	52	NA	53
Percent of Adults 50 and over who have ever had a sigmoidoscopy	2002		53.10%	2	52.60%
Percent of Adults 50 and over who have had a blood stool test in past two years	2002		33.30%	2	33.50%
Breast Cancer					
Deaths	2001-03	116	25	3	22.9
Incidence	2000-02	579	129	NA	122.2
Prostate Cancer					
Deaths	2001-03	78	27.5	3	23.3
Incidence	2000-02	611	175	NA	150.3
Cervical Cancer					
Deaths	2001-03	12	2.4	2	2.8
Incidence	2000-02	51	10.9	NA	10.5
Percent of adult (18+) women who have had a pap test in past three years	2002		82.40%	2	82.20%
Skin Cancer					
Deaths	2001-03	24	2.8	2	2.8
Incidence	2000-02	116	13.8	NA	16.2
Chronic Lower Respiratory Diseases (CLRD)					
Deaths	2001-03	335	43.6	2	39.4
CLRD Hospitalizations	2001-03	2,843	327.5	2	363.9
Percent of Adults (18+) with asthma	2002		10.80%	2	10.70%
Asthma Hospitalizations[4]	2001-03	5,676	613.5	3	592.7
Diabetes					
Deaths	2001-03	192	24.2	2	21.1
Hospitalizations[4]	2001-03	18,561	2,197.70	4	1,813.00
Hospitalizations from amputation due to diabetes[4]	2001-03	244	29.3	3	25.1

Table 3.9.1. Concluded

Percent of Adults who have ever been told by a health professional that they have diabetes	2002		7.40%	2	8.20%
Behavioral Risk Factors (BRFSS) Data (Percent of Adults...)					
Who have been told by a health professional that their blood pressure is high	2002		21.80%	1	27.70%
Whose blood cholesterol is high	2002		27.40%	1	35.20%
Who have had their cholesterol checked in last two years (of those ever measured)	2002		78.30%	4	83.10%
With NO regular moderate physical activity	2002		60.30%	4	55.10%
With NO regular vigorous physical activity	2002		80.10%	3	75.60%
Who engage in no leisure-time physical activity	2002		30.60%	3	26.40%
Who consume < 5 servings of fruits and vegetables per day	2002		75.70%	3	74.30%
Who are overweight (BMI >25)	2002		29.20%	1	35.10%
Who are obese (BMI>=30)	2002		25.70%	3	22.30%

[1]All Age-Adjusted rates are 3-year rates and are calculated using the 2000 Standard US Population These rates also use July 1 Florida population estimates from the Florida Legislature Office of Economic and Demographic Research Click for trend graph Trends not aviailable for BRFSS data

Age-adjusted cancer incidence rates are not displayed for fewer than 10 cases (NA)

[2]Quartile

1 - Most Favorable Situation (25% of counties)
2-3 - Average (50% of counties)
4 - Least Favorable Situation (25% of counties)

Quartiles in this report allow you to compare health data from one county to another in the state Quartiles are calculated by ordering an indicator from most favorable to least favorable by county and dividing the list into 4 equal-size groups In this report a low quartile number (1) always represents more favorable health situations while fours (4) represent less favorable situations Quartiles not available for age-adjusted cancer incidence rates (NA)

[3]Healthy People 2010 goals are single-year rates per 100,000 population (or percentages) at the national level Goals are not available for all indicat
[4]Includes primary and contributing diagnoses

Data Sources
Deaths - Florida Department of Health, Office of Vital Statistics
Risk Factor (BRFSS) - Florida Department of Health, Bureau of Epidemiology
Hospitalizations - Florida Agency for Health Care Administration (AHCA)
Cancer Incidence - University of Miami (FL) Medical School, Florida Cancer Data System

3.9.2 Electromagnetic Fields

3.9.2.1 Background

Electromagnetic radiation is the propagation of energy by time-varying electric and magnetic fields. This energy is transmitted through space or some material medium as a disturbance traveling at or near the speed of light, without the transport of matter. Energy is distributed across the electromagnetic spectrum, which is a continuum composed of spectral regions depicted in Figure 3.9.3.

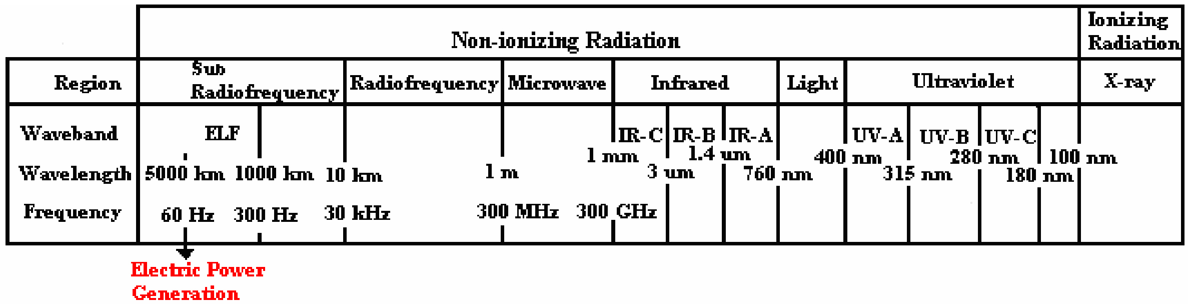

Figure 3.9.3. The electromagnetic spectrum.

An electric field is created by electric charges. The strength of the electric field is expressed in volts per meter. A magnetic field is created by a current (i.e., the movement of electric charges). The magnetic field strength is expressed in amperes per meter, or Gauss. Both the electric and magnetic fields decrease rapidly with distance from the source (e.g., distance from the transmission line). Because the electric field is a function of the voltage impressed on the transmission line, the electric field remains relatively constant with time at any given location. However, magnetic fields fluctuate in relation to the flow of electricity through the line in response to consumer demand for power.

3.9.2.2 Health Implications

Over the past two decades, some members of the scientific community and the public have expressed concern regarding human health effects from electromagnetic fields (EMF) during the transmission of electrical current from power plants. The scientific evidence suggesting that EMF exposures pose a health risk is weak. The strongest evidence for health effects comes from observations of human populations with two forms of cancer: childhood leukemia and chronic lymphocytic leukemia in occupationally exposed adults (NIEHS 1999). The National Institute of Environmental Health Sciences report concluded that “extremely low-frequency electric and magnetic field exposure cannot be recognized as entirely safe because of weak scientific evidence that exposure may pose a leukemia hazard” (NIEHS 1999). While considerable uncertainty still exists about the EMF health effects issue, the following determinations have been established from the available information:

- Any exposure-related health risk to an individual would likely be small.
- The types of exposures that are most biologically significant have not been established.
- Most health concerns relate to magnetic fields.

- Measures employed for EMF reduction can affect line safety, reliability, efficiency, and maintainability, depending on the type and extent of such measures.

3.9.2.3 Regulatory Requirements

Occupational limits for the portion of the electromagnetic spectrum defined as the radio frequency/microwave region have been established by the Occupational Safety and Health Administration to prevent tissue heating (29 CFR Part 1910.97). No federal regulations have been established specifying environmental limits for the extremely low frequency (ELF) fields from electrical transmission lines.

Florida residents have voiced concerns about the potential for adverse health effects from exposure to electric and magnetic fields. In 1989, as a result of these concerns and a legislative mandate, the Environmental Regulation Commission adopted a rule limiting EMFs from new electrical transmission lines and substations. Due to the lack of conclusive scientific evidence that exposure to transmission line EMFs would produce adverse health effects (Section 3.9.2.2), the Environmental Regulation Commission based the field-strength standards on the premise that new transmission lines and substations should not produce fields greater than the EMFs from existing lines. The Environmental Regulation Commission also required the Florida Department of Environmental Protection to monitor EMF scientific research and to report annually on the findings.

To reasonably protect public health and welfare, the Florida Department of Environmental Protection regulates electric and magnetic fields from electrical transmission lines and substations rated at 69 kilovolts (kV) or greater (Chapter 62-814). Section 62-814.450 specifies electric and magnetic field strengths for existing and new lines and substations. For new lines and substations, limits at the edge of the transmission right-of-way or at the property boundary of the substation are 2 kV/m for electric field strength and 150 milliGauss for magnetic field strength.

3.9.2.4 Existing Conditions

The existing generating capacity of the Stanton Energy Center is approximately 1,569 MW. All electrical transmission lines servicing the power plant are rated at 230 kV. The existing transmission lines and substation are marked by yellow lines in Figure 3.9.4.

3.9.3 Worker Health and Safety

3.9.3.1 Safety Management

Unsafe acts and conditions involving standard industrial hazards that could adversely affect worker health and safety are regulated by the Occupational Safety and Health Administration. Applicable regulations governing occupational safety and health include 29 CFR Part 1910 for general industrial operations and 29 CFR Part 1926 for general construction hazards.

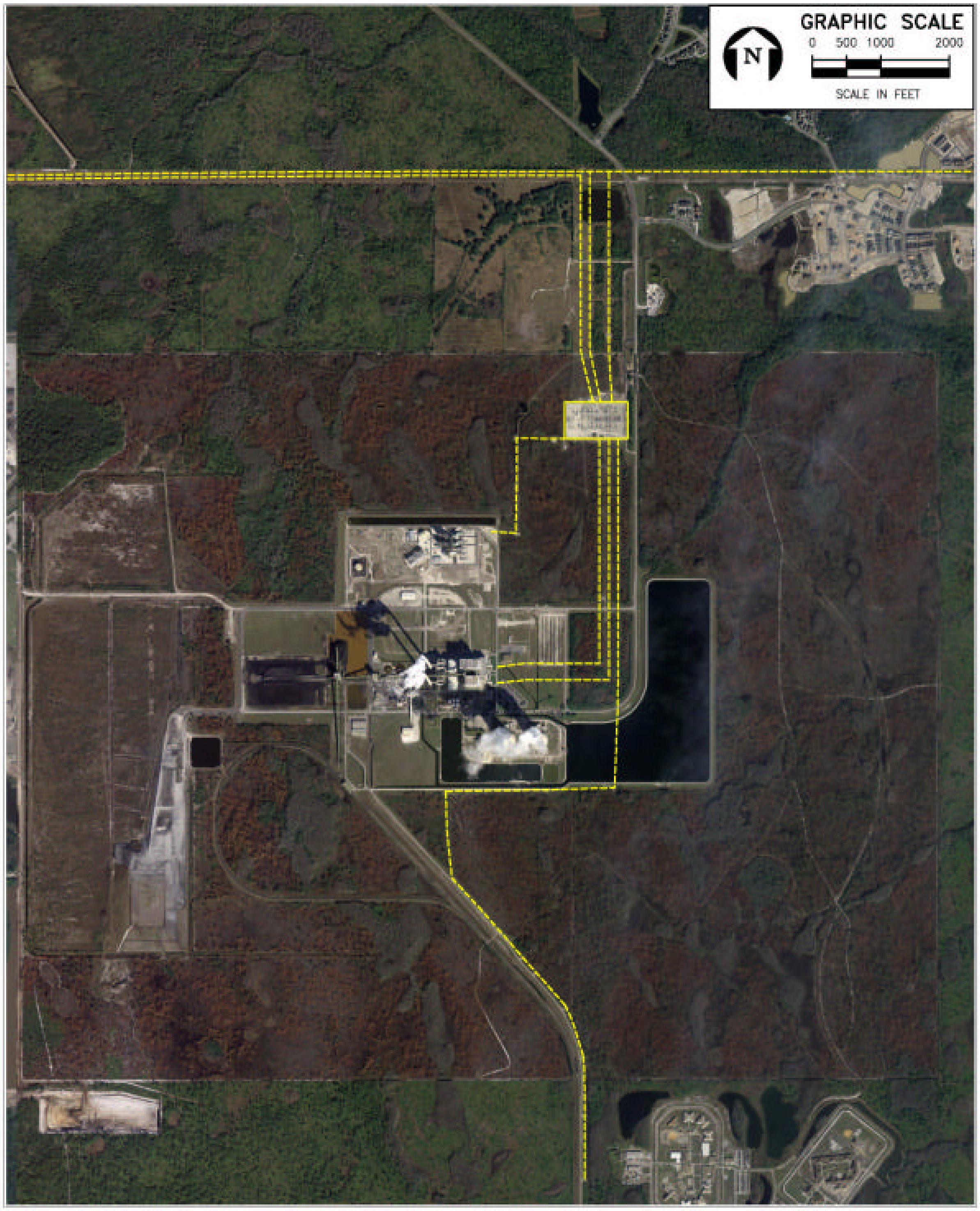

Figure 3.9.4. Location of electrical transmission lines (dashed yellow lines) and substation (solid yellow rectangle) on the Stanton Energy Center site and in the immediate vicinity.

Stanton Energy Center personnel currently maintain written operating procedures and programs for all covered processes, including safety; accident reporting; first aid; fire prevention and protection; hazard communication; welding and cutting; personal protection equipment; tools and equipment; supports and scaffolding; vehicles; material handling, lifting, and storage; excavation and trenches; painting and sandblasting; laboratory safety; electrical maintenance; hazardous energy control; confined space entry; and railway operation.

3.9.3.2 Occupational Illnesses, Injuries, and Fatalities

The Bureau of Labor Statistics annually provides the occupational injury and illness rates and the number of occupational fatalities in the United States and individual states. Such information is useful in identifying industries with high rates and/or large numbers of injuries, illnesses, and fatalities. The results of the annual reports can be used by industry organizations and private companies to start or revise worker safety programs that hopefully will reduce, and ultimately prevent, workplace injuries, illnesses, and fatalities. The Bureau of Labor Statistics (2003a) defines a work-related injury as "any wound or damage to the body resulting from an event in the work environment."

A total of 4.4 million nonfatal injuries and illness were reported in private industry workplaces in the United States during 2003 (the most recent year with complete data), resulting in a rate of 5.0 cases per 100 equivalent full-time workers. Table 3.9.2 provides the overall rate, as well as rates for the construction and utilities sectors (including power generation) for the United States and Florida. The data indicate that the recordable injury and illness rates for utilities are less than for private industry overall, while the construction rates are greater than for private industry overall.

Table 3.9.2. Recordable occupational injury and illness rates for the United States and Florida (2003)

Industry	Total recordable incidence rate per 100 full-time employees: United States	Florida
Private industry (overall)	5.0	5.0
Construction	6.8	7.5
Utilities	4.4	4.0

Source: U.S. Department of Labor, Bureau of Labor Statistics 2003. Bureau of Labor Statistics News Workplace Injuries and Illnesses in 2003. http://www.bls.gov/news.release/pdf/osh.pdf.

The Bureau of Labor Statistics (2003b) defines a fatality as "a death that results from a traumatic occupational injury," where injury is defined in this case as "any intentional or unintentional wound or damage to the body resulting from acute exposure to energy, such as heat, electricity or kinetic energy from a crash, or from the absence of such essentials as heat or oxygen caused by a specific event, incident, or series of events within a single workday or shift." In 2003, the construction industry reported 1,131 fatalities in the United States, while the utilities industry reported 32 fatalities (Table 3.9.3). In the state of Florida, 93 construction fatalities and 4 utilities industry fatalities were reported.

Table 3.9.3. Number of fatal occupational injuries (2003)

Industry	Number of U.S. fatalities	Number of Florida fatalities
Construction	1,131	93
Utilities	32	4

Sources: U.S. Department of Labor, Bureau of Labor Statistics 2003. Bureau of Labor Statistics News – National Census of Fatal Occupational Injuries in 2003. http://www.bls.gov/news.release/pdf/cfoi.pdf.

U.S. Department of Labor, Bureau of Labor Statistics 2003. Bureau of Labor Statistics News – Florida Workplace Fatalities, 2003. http://www.bls.gov/news.release/pdf/cfoi.pdf.

A review of the Stanton Energy Center's Occupational Safety and Health Administration Form 300 logs for 2001–05 indicates that (1) no fatalities occurred; (2) Units 1 and 2 have had several reportable injuries since October 2001, but only 11 incidents involving lost workdays; and (3) Unit A has not reported any work-related injuries except for one incident that occurred in March 2004 (the injury consisted of a separated left shoulder resulting in the employee being temporarily transferred, but did not result in any lost workdays).

3.9.3.3 Onsite Hazard Areas

Existing hazard areas at the Stanton Energy Center include the fuel storage area; chlorine storage area; ammonia storage area; power blocks; compressed gases area; transformer areas and substation; cooling water chemical treatment area; waste storage area; water treatment area; coal receiving, storage, and handling areas, including the conveyor system; and transmission lines. The greatest potential hazards are associated with the chlorine, ammonia, and fuel storage areas due to their concentrated storage quantities.

Various types of fuel and oils are stored at the Stanton Energy Center. However, the vast majority of oil is No. 2 diesel oil stored in above-ground storage tanks. Hazards associated with the fuel storage area include fire and explosion or spills and discharges to the environment. To address the fire and explosion potential, the power plant has a written emergency action plan, which meets the requirements of 29 CFR Part 1910.38 (Occupational Safety and Health Administration), providing specific actions to be followed in emergency situations. The plan is designed to address a wide variety of emergencies caused by fire, explosion, natural disaster, or threats that may threaten personnel, property, production, or the environment. In addition, the Stanton Energy Center has a facility response plan, as required by 40 CFR Part 112 for facilities with a total oil storage capacity of greater than 1 million gal that are located at a distance such that a discharge from the facility could possibly affect environmentally sensitive areas.

Chlorine, which is used at the Stanton Energy Center to treat cooling tower water, is stored in 1-ton vessels containing liquefied chlorine gas. Anhydrous ammonia is used in the Unit 2 and Unit A selective catalytic reduction systems to reduce NO_x emissions. Within the Occupational Safety and Health Administration's general industrial regulations, a section titled "Process Safety Management of Highly Hazardous Chemicals" (29 CFR Part 1910.119) addresses requirements for preventing or minimizing the consequences of catastrophic releases of toxic, reactive, flammable, or explosive chemicals. For hazards that may have impact beyond the plant boundaries, applicable regulations include the EPA's 40 CFR Part 68 (Chemical Accident Prevention Provisions), which is also referred to as the risk management program regulation, and the Florida Accidental Release Prevention and Risk Management Planning Act (Part IV of Chapter 252 of the Florida statutes).

3.10 Noise

3.10.1 Background

In air, sound is usually described in terms of oscillations in pressure above and below ambient atmospheric pressure. The human ear can detect a range of pressure that varies by a factor of about 1,000,000. The decibel is a logarithmic rating system used to scale sound that accounts for this large difference in audible intensities. The pressure oscillations generated by a vibrating surface or turbulent fluid flow cause high and low pressure areas to be formed, which then propagate away from the source. The rate at which the pressure oscillations are produced is the frequency, which has units of hertz (Hz). One hertz equals one cycle per second. Pitch is the human perception of frequency, with normal human hearing ranging from about 16 Hz to 20,000 Hz.

Sounds in the ambient air typically contain many superimposed frequencies of varying pressures. People's perception of loudness to sound is both pressure and frequency dependent. Human hearing is best at frequencies of around 500 Hz to 5000 Hz, and people are most annoyed or disturbed by noise in this range. Monitoring instruments are designed to electronically filter the noise signal to emphasize frequencies within the response range of the human ear. The most common noise descriptor used for ambient noise assessments is dBA. Extensive studies have shown that noise passed through the A-weighting network correlates well with noise disturbance perceived by people. A-weighting has the effect of reducing measured levels of very low and very high frequencies, but has less filtering effect on the mid-range frequencies where speech and communication are important.

Typical sound levels of familiar noise sources and activities are presented in Table 3.10.1. The human perception of a doubling of loudness is reflected in the scale as an increase of 10 dBA. Therefore, a 70-dBA sound level would sound twice as loud as a 60-dBA sound level to most individuals. People's perception of noise increases depends on the nature of the background noise compared to the intruding noise. If the background noise is of the same character as the intruding

Table 3.10.1. Common noise sources, sound levels, and human responses

<table>
<tr><th>Thresholds/
Noise Sources</th><th>Sound Level
(dBA)</th><th>Subjective
Evaluations[1]</th><th>Possible Effects
on Humans</th></tr>
<tr><td>Human threshold of pain
Carrier jet takeoff (50 ft)</td><td>140</td><td rowspan="4">Deafening</td><td rowspan="7">Continuous exposure can cause hearing loss in majority of population</td></tr>
<tr><td>Siren (100 ft)
Loud rock band</td><td>130</td></tr>
<tr><td>Jet takeoff (200 ft)
Auto horn (3 ft)</td><td>120</td></tr>
<tr><td>Chain saw
Noisy snowmobile</td><td>110</td></tr>
<tr><td>Lawn mower (3 ft)
Noisy motorcycle (50 ft)</td><td>100</td><td rowspan="2">Very loud</td></tr>
<tr><td>Heavy truck (50 ft)</td><td>90</td></tr>
<tr><td>Pneumatic drill (50 ft)
Busy urban street, daytime</td><td>80</td><td rowspan="2">Loud</td></tr>
<tr><td>Normal automobile at 50 mph
Vacuum cleaner (3 ft)</td><td>70</td><td rowspan="2">Speech interference</td></tr>
<tr><td>Large air conditioning unit (20 ft)
Conversation (3 ft)</td><td>60</td><td rowspan="2">Moderate</td></tr>
<tr><td>Quiet residential area
Light auto traffic (100 ft)</td><td>50</td><td rowspan="2">Sleep
Interference</td></tr>
<tr><td>Library
Quiet home</td><td>40</td><td rowspan="2">Faint</td></tr>
<tr><td>Soft whisper (15 ft)</td><td>30</td><td rowspan="4"></td></tr>
<tr><td>Slight rustling of leaves</td><td>20</td><td rowspan="3">Very faint</td></tr>
<tr><td>Broadcasting studio</td><td>10</td></tr>
<tr><td>Threshold of human hearing</td><td>0</td></tr>
<tr><td colspan="4">[1] Note that both the subjective evaluations and the physiological responses are continual without true threshold boundaries. Consequently, there are overlaps among categories of response that depend on the sensitivity of the individuals exposed to noise.

Wallula Power Project DEIS
February 2002</td></tr>
</table>

Source: EPA 1971

noise (e.g., new traffic noise added to existing traffic noise), then people generally cannot detect differences less than 1 dBA. However, if the intruding noise is of a different character than the background noise (e.g., the whine of a new turbine superimposed onto rural background noise), then the intruding noise could be easily discernible even if it adds less than 1 dBA to the background noise level.

Characterizing noise that varies with time can be accomplished in a variety of ways. The method consistent with the Orange County noise ordinance (Section 3.10.2) uses the "equivalent sound level" (L_{eq}). The L_{eq} is a single descriptor based on the average acoustic intensity over a specified period of time. The "day-night sound level" (L_{dn}) is similar to the L_{eq}, except that a 10-decibel factor is added to artificially increase noise sources between 10 p.m. and 7 a.m. to apply more stringent standards of compliance for that time period.

3.10.2 Regulatory Requirements

The state of Florida has no applicable noise laws or regulations. However, Orange County ordinance Chapter 15 (Article V) titled "Noise and Vibration Control" was enacted to prevent, prohibit, and provide for the abatement of excessive and unnecessary noise and vibration in the unincorporated area of the county in order to protect the health, safety, and general welfare of the county inhabitants. Chapter 15 stipulates maximum permissible sounds levels; land use categories; times; measurement descriptors; and adjustment for character of sound. For residential areas, the noise limit is 60 dBA from 7 a.m. until 10 p.m. and 55 dBA from 10 p.m. until 7 a.m. For noise-sensitive zones (i.e., quiet zones where serenity is of extraordinary significance), the noise limit is 55 dBA at any time. Motor vehicles operating on a public right-of-way are exempt from the noise ordinance. The ordinance also limits frequency-dependent sound pressure levels and impulsive noise.

3.10.3 Ambient Noise Levels

The Stanton Energy Center currently operates within the noise guidelines stipulated by the Orange County noise ordinance (Section 3.10.2). Sound levels at the plant site are similar to those at other industrial plants surveyed by Goodfriend and Associates (1971). The relatively steady noise resulting from the plant is augmented by the presence of other sound sources in the area, including other industrial activities, vehicular traffic, and nearby passing trains and airplanes. The nearest residential area to the proposed facilities is Avalon Park, located approximately 6,500 ft to the northeast.

Ambient noise to characterize the existing acoustic environment was measured by Environmental Consulting & Technology, Inc., for brief periods at six locations on or near the power plant site. Measurements were made with a sound pressure level meter with "A" frequency weighting and were reported as sound pressures levels referenced to a baseline of 0.00002 N/m^2. During the noise survey, Units 1, 2, and A were in operation, and light winds were generally from the south. These data, collected at the locations shown in Figure 3.10.1, are presented in Table 3.10.2.

The narrow range of noise levels at Location 1 resulted from the steady noise generated by operation of the nearby Unit A, including its cooling tower. Based on the measurements at Location 1, noise attenuation with distance is likely to reduce the noise generated by Unit A to below the 55 dBA and 60 dBA limits imposed by the Orange County noise ordinance in residential areas and noise-sensitive zones (Section 3.10.2). Wider variability in noise levels was measured at most of the other locations, where passing vehicles and other brief events caused higher maximum levels and greater disparity relative to the lowest levels. Noise from the electrical generating units and associated facilities was only faintly observed at the northern property boundary (Location 3) during the evening of August 17 and was not detected at any other location. Noise levels measured at Location 4, the residential location, do not appear to be the result of noise emanating from the Stanton Energy Center site.

Figure 3.10.1. Locations at which noise levels were measured (August 16 and 17, 2005).

Table 3.10.2. Ambient noise survey results (August 16 and 17, 2005)

Location	Date	Time	Duration (min)	Range of noise levels (dBA)	L_{eq} (dBA)	Prevailing noise sources
1	16	10:44	11	68.2 to 77.2	69.2	Unit A, Unit A cooling tower, gas metering station, passing vehicles, Units 1 and 2
2	16	11:04	9	45.7 to 80.9	61.2	Insects, compressor engine, heavy equipment on landfill, passing garbage trucks, heavy equipment
3	16	11:25	19	49.1 to 79.1	58.2	Concrete batch plant, passing trucks, insects
	17	18:50	23	40.1 to 70.1	52.2	Insects, passing trucks, overhead jets, power plant (faint), traffic on BeeLine Expressway (faint)
4	16	13:32	12	44.6 to 94.1	73.3[a]	Passing vehicles, insects
5	16	14:02	14	43.1 to 75.3	54.9	Insects, static from overhead transmission lines, overhead jets, traffic on BeeLine Expressway
6	16	14:23	11	47.6 to 72.2	57.1	Insects, birds, traffic on BeeLine Expressway, trucks on on-ramp, vehicles traveling to/from corrections center

[a]For residential areas, the Orange County noise limit is 60 dBA from 7 a.m. until 10 p.m. and 55 dBA from 10 p.m. until 7 a.m.

Existing steam blowdowns as part of scheduled maintenance at the power plant are estimated to generate noise levels of 102 dBA at a distance of 50 ft from the source. Attenuation with distance is estimated to reduce noise levels to 66 dBA at the northern property boundary and 58 dBA at the Avalon Park boundary.